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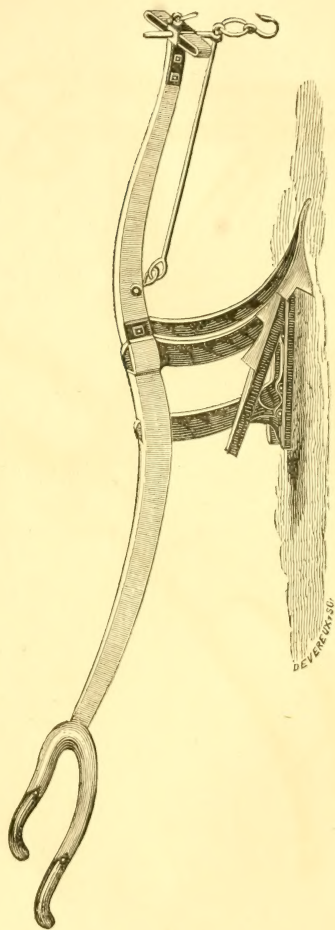
FIRST REPORT

ON THE

AGRICULTURE OF MASSACHUSETTS.

Colman

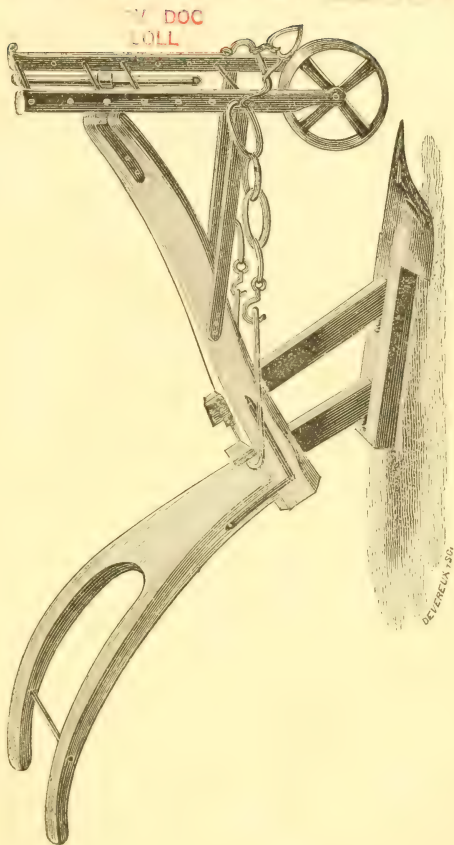
SMITH'S SUBSOIL PLOUGH.



SEE APPENDIX M.

DEVEREUX & SONS.

THE RACK-HEATH PLOUGH.



SEE APPENDIX N.

FIRST REPORT

ON THE

AGRICULTURE OF MASSACHUSETTS.

By HENRY COLMAN,

COMMISSIONER FOR THE AGRICULTURAL SURVEY OF THE STATE.

COUNTY OF ESSEX.

1837.

Boston:

LUTTON AND WENTWORTH, STATE PRINTERS.

1838

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Commonwealth of Massachusetts.

IN COUNCIL, March 1, 1838.

His Excellency the Governor presents the first Report of the Commissioner for the Agricultural Survey of the State, and it is thereupon *Ordered*, That the Secretary cause three thousand copies thereof to be printed for distribution.

Attest,

JOHN P. BIGELOW,

Secretary of the Commonwealth.

To His Excellency

EDWARD EVERETT,

Governor of Massachusetts :

SIR,

I have the honor to lay before you my first Report as Commissioner for making an Agricultural Survey of the State. It includes the county of Essex. A report of the survey of the county of Berkshire with incidental matter relating to the culture of silk and beets for sugar, objects now strongly attracting the attention of the farmers of New England is advanced ; and will be submitted with as little delay as possible. The labor of examining and condensing for the public eye a large number of miscellaneous documents, notes, reports, and communications, can be justly appreciated only by those who have performed it.

This report for obvious reasons will necessarily be imperfect. Its publication however will much facilitate the further progress of the survey by letting the agricultural public know what information is sought ; and will afford occasion to the farmers to say what they desire should be done. I shall anxiously attend to the indication of their wishes ; and to any suggestions which may be made for the improvement of the Survey.

If the Survey results in no other good, it will present, I hope, in their true light the motives which the children of Massachusetts have to stay at home. Her rewards to industry, enterprise, and good conduct, directed by intelligence and under the guidance of temperance and prudence in the cultivation of her soil, are sufficient to satisfy every reasonable desire. Her social institutions and privileges are pre-eminent ; and such as no new and unsubdued territory can expect to reach, under the most favorable circumstances, even in half a century.

Filial reverence and affection are honorable traits of character and among the highest duties of religion. Let the children of Massachusetts then love and honor their good old mother. Her

soil may be hard ; but labor compels it to be bountiful. Her climate may be harsh ; but it gives strength and elasticity to the muscles, and the brightness of its own stars to the mind. Her voice in winter may be sometimes hoarse, and her face wrinkled and frowning ; but her children will not love her the less for a sternness of discipline, by which she trains them up in habits of unremitting labor and self-dependence ; and thus qualifies them to be the blessings and ornaments of their own community ; the substantial pillars of the federal edifice ; and the pioneers of learning, civilization, humanity, and religion in the boundless West.

I am glad, even in the most humble form, to contribute to that large amount of good, which the Commonwealth is deriving from your patriotic services. I am particularly happy, Sir, that in any public service my name should be associated with yours ; from considerations of honor to myself, and not less, from the sentiments of high personal regard with which I have the pleasure to subscribe myself,

Your fellow-citizen,

HENRY COLMAN.

Boston, Feb. 22, 1838.

Extracts from the Statement of the Commissioner of Agricultural Survey to the Committee of Agriculture of the House of Representatives of Massachusetts, who were "Ordered to inquire, what progress had been made in the Agricultural Survey of the State,"
7 Feb. 1838.

The Resolve for an agricultural survey of the state bears date the 12th April, 1837. The appointment of a commissioner was made on the 27th of the ensuing May; and he received his instructions for its prosecution on the 15th of June.

The resolve requires of the commissioner that he should "make an Agricultural Survey of the State; collect accurate information of the state and condition of its agriculture, and every subject connected with it; point out the means of improvement; and make a detailed report thereof with as much exactness as circumstances will admit."

The service, it will be seen, was in a measure indefinite; but sufficiently large, since it required "the collecting of accurate information and reporting with exactness and in detail, on the state and condition of the agriculture of the Commonwealth; and every subject connected with it, as well as the means of its improvement," involving of course the improvements practicable and desirable.

The Executive, in his letter of instructions* to the commissioner, expresses an opinion that the execution of the survey would require two years. The committee, who reported the resolve were of opinion that three years would be required. The commissioner has hoped to bring it within the term prescribed by the Executive. It will be seen, however, that from the advanced state of the season when he received his instructions, and the preparations indispensable before he could commence his examinations, a valuable part of the season was necessarily lost. Besides which, at the request of the committee of the Executive council, he was in attendance upon them a fortnight at their session in August and September, in determining the necessary expenses of the survey.

* Appendix A.

In an enterprise altogether unattempted in our own country, it was necessarily left in a great measure to the commissioner to determine his own course of proceeding under the sanction of the Governor.

He accordingly prepared a circular letter to the farmers of Massachusetts explaining his notions of the nature of the survey, and pointing out in detail the various objects embraced by it. Of this letter the Governor was pleased to signify his approbation. A copy of it, he has now the honor to submit to the committee.* Of this letter, the preparation of which required some labor, he caused 2,500 copies to be printed and distributed in various parts of the State. Afterwards finding it indispensable in the prosecution of his inquiries, he caused to be published and distributed extensively, wherever he visited, a blank form of a Farm Report, a copy of which also, he submits to the committee.†

In the prospectus of the survey the chemical analysis of soils, mineral manures found in the state, botanical productions, insects and worms affecting crops, and forest trees, are put down as subjects of inquiry. From these, by the instructions of the Executive, he is excused, as they come immediately within the survey of other departments. His duties, however, make them incidentally indispensable objects of inquiry ; and they have accordingly in a degree received his attention.

It will be seen that the information sought after was not to be had but from personal observation and direct intercourse with the farmers themselves ; on their own premises ; by correspondence ; or wherever they could be met with. He has accordingly undertaken to visit every town in the Commonwealth. He has given it likewise to be understood as his wish to visit every principal farm in every town, the management of which promises to afford useful information. In determining what particular farms to visit, it is obvious that he must necessarily be directed by the advice or suggestions of others ; but in order to avoid all invidiousness, he stated plainly, in the outset, that unless prevented by extraordinary circumstances, he would visit every farmer, who would invite him to his premises ; having a perfect confidence that he should find oftentimes as creditable and in-

* Appendix B.

† Appendix C.

structive management among small farmers, as among those who pursue agriculture upon an extensive scale.

He commenced his survey in the county of Essex. He visited every town in this county more than once, and at the end of September he went into the county of Berkshire. He attended the Cattle Shows in Essex and in Berkshire; and continued in the latter county, with the exception of an excursion into Hampshire county, until the last of November, when the snow rendered the out-door prosecution of his labors impracticable. In October he went, as stated above, into Hampshire county, for the purpose of attending the Cattle Show and Exhibition at Northampton; and particularly that he might ascertain the precise condition and prospects of the Silk culture and manufacture, and the culture of Beets for sugar in that vicinity; two matters in respect to which the public curiosity is excited; and which, from the direct encouragement promised by the laws of the Commonwealth, essentially concern the public interest. Besides these he has made visits to several other towns in the Commonwealth, for the prosecution of his inquiries, as they came incidentally in his way.

He has applied himself to every principal object of agricultural inquiry that has suggested itself, or been pointed out to him; and personally inspected every considerable improvement in cultivation, in reclaiming land, in seeds, in crops, in farm buildings, in farming utensils, and in live stock, of which he could get any information, wherever he has been.

In the course of his journeys likewise, he has had as many inquiries put to him as he has put to others. He has by request delivered several public addresses; and in many towns and villages, considerable numbers of the farmers have invited him to meet them, of which opportunities he has gladly availed himself to get and to give information. The information which he has sought to communicate has been wholly practical and experimental. His visits have in such cases been welcomed; and in evidence of their supposed utility, he begs leave to submit to the Committee an extract of a letter received by him from a highly intelligent farmer in Berkshire, late President of the Berkshire Agricultural Society.*

The principal objects of his inquiries have been,—

I. **THE CROPS** ; their amount and uses ; the modes of cultivation ; the cost of production ; their positive and comparative value.

II. **THE LIVE STOCK** : their kinds ; the cost of keeping, modes of being kept ; yield or produce ; the improvements made in them ; and the comparative advantages of different kinds or breeds.

III. **COMPARATIVE AND MIXED HUSBANDRY**. The Dairy ; Wool ; Vegetable Crops ; Grain Crops ; the selling of Hay ; Grazing and raising Neat Cattle ; Fattening of Beef, Pork, and Mutton ; Raising of Lambs for market ; Silk ; Beet Sugar ; Teasles ; Broom Corn.

IV. **IMPLEMENTS**. Ploughs, Harrows, Threshing Machines, Drill barrows for planting, Cultivators, &c.

V. **MANURES**. Green Crops ploughed in. Use of Barn manure, Lime, Gypsum, Marls, Fish, Seaweeds, Shells, Clay.

VI. **GROWTH OF WOOD**. Value of land for wood. Kinds of wood grown, and relative profits. Hedges. Peat. Charcoal.

VII. **WEEDS PERNICIOUS TO AGRICULTURE**.

VIII. **BEEES**.

IX. **IMPROVEMENTS** in reclaiming salt meadow ; in managing salt meadow ; in reclaiming fresh meadow ; in cultivation.

These are not enumerated as the only subjects of inquiry ; but as subjects of inquiry on which he has obtained in those parts of the state where he has been, practical information, the result of experience, which will be valuable ; and which he designs to embody in his report.

Of Mixed Husbandry, he has the pleasure to state to the Committee, that he has received several reports, which he will submit to the public.

Any person familiar with our farming population will in some degree appreciate the difficulties in the way of obtaining in an authentic form the information which he has sought.

He designs no improper reflection. Some will overstate ; some understate. Some will not state at all. Some through indifference or carelessness keep no accounts of their farming operations. Some through diffidence are unwilling to tell their experience. Many persons were utterly ignorant of the objects of the survey, and naturally regarded with a degree of suspicion or caution an

individual coming under a sort of authority to look into their affairs. Some from an habitual distrust of all reports, were unwilling to give any, lest their veracity should be questioned ; and not a few were disinclined to make any statement lest it should raise the valuation and increase their taxes. Many promised full reports, but to his severe disappointment, have not fulfilled their promises.

Notwithstanding all these exceptions, yet among the intelligent, enterprising, and public spirited, as soon as his objects were understood, they were seen to be disinterested and for the public good. Such persons rendered essential aid, and have promised their future co-operation. He has received several valuable reports and communications of which he shall avail himself.

He has deemed it an important part of his duty to collect seeds valuable either for the quality and abundance of their product, or for their early maturity, that he might either furnish the farmers with these approved varieties or put them in the way of supplying themselves. In this matter he has no view whatever either directly or indirectly to any personal advantage ; but altogether to the advantage of the farmers themselves.

He has collected several specimens of wheat, barley, Indian corn, buckwheat, teasles and potatoes. He has sent to Portugal for a valuable variety of wheat said to ripen in seven weeks ; to Italy for a kind of Indian corn of the flint variety, said to bear four to five ears on a stalk ; to Germany for seeds of teasles much superior to those grown among us, and sold at 100 per cent. advance upon ours ; to Nova Scotia for a kind of oats reputed highly valuable for their weight and not subject to blight ; to New York for potatoes of extraordinary productiveness and for the Siberian and Italian wheat ; and to New Hampshire for early and productive varieties of corn. He is expecting to obtain likewise some seed of a kind of corn which is said to have ripened perfectly on the shores of Lake Superior. He has taken pains likewise to obtain the model of a Scotch bow for harvesting grain of a simple, useful and cheap construction ; and of a drill barrow from Berkshire county, recommended strongly by the same qualities. He has taken measures to procure the best model of a plough, and to get information which he thinks he has

acquired, of the least expensive threshing machine effectual for the farmer's purposes. He has likewise engaged a model, which he expects will be sent to him, of an excellent steaming apparatus for the preparation of feed for cattle. All these are matters of his own private expense to be allowed or not at the pleasure of the Executive.

The correspondence of his office has been considerable ; and is daily extending—it being his determination to avail himself of every opportunity at home or abroad of obtaining such information as may benefit the agriculture of the state.

He has likewise, once of his own movement, and a second time at the instance of the Committee on Agriculture, addressed the members of the Legislature at large on this great interest of the state ; being desirous to communicate whatever information he possessed for the general benefit ; and to awaken a just concern in the subject with others.

Exact returns from the different towns of the number of acres cultivated or under improvement and the amounts of agricultural produce obtained, and of live stock, he has found it impossible by his individual exertions to obtain. In this respect he hopes the government will aid the survey by some general law. The returns of the assessors made seven years since, give very imperfect statements of the present agricultural condition of the Commonwealth.

His report, in the present state of the survey, must be partial and imperfect. No reports of the soils, of the forest trees, of the domestic animals, and of the insects, have as yet been submitted, of which so soon as they should be connected with agriculture he is promised, when presented, permission to avail himself.

The Legislature have been pleased by a resolve to assign him the use of a room in the State-house for an office ; but as the grant was only during the session, and as the inconvenience of making a removal at the close of the session would be considerable, he has hesitated to avail himself of their kindness. A permanent office, with the usual accommodations, where he might exhibit samples of wool, silk, seeds and plants, and such plans or models of farm buildings, implements, or machinery, as it might be convenient to place there ; and where the intercourse between the members of the government and the commissioner of this department could be easy and frequent, might be of public advantage.

REPORT

ON THE

AGRICULTURE OF THE COUNTY OF ESSEX, MASS. 1837.

ESSEX COUNTY lies at the northeastern part of Massachusetts ; and is bounded on the northwest by New Hampshire ; on the east and northeast by the Atlantic Ocean ; and southeast by Massachusetts Bay ; and on the southwest by the County of Middlesex. It embraces in extent 360 square miles. Its population in 1830 was 82,887 ; its present population 93,689 ; being about 260 inhabitants to a square mile. It contains twenty-six towns. It is intersected through its whole width by the river Merrimack, which empties into Massachusetts Bay at Newburyport ; and the rivers Shawsheen and Agawam or Ipswich. Parker and Saugus rivers are likewise found, but are inconsiderable in length and magnitude.

The general surface of the county is uneven ; but there are no hills of great elevation, and few, which may not be cultivated to their summits. The county, for its whole length on the eastern side, is washed by the Atlantic Ocean. Cape Cod, its eastern extremity, projects into the sea, a distance of sixteen miles ; and the coast is lined with a rocky shore or extensive beaches ; and pierced by innumerable inlets and creeks, on which are extensive tracts of salt alluvial meadow. The county abounds likewise in tracts of a greater or less extent of fresh meadow or peat-bog. A considerable amount of this land has been drained ; and by the application of sand, gravel, or loam to its surface, has been converted into profitable mowing. Much of this same description of land remains to be redeemed ; and will fully compensate for the expenditure, which this improvement may require. There are considerable tracts on the Agawam river,

the waters of which are forced back by the mill-dams thrown across it near its mouth, which must be regarded as irreclaimable while those obstructions remain.

The climate of Essex County is affected by its maritime situation. The proportion of snow which falls in the course of the year is considerably less than falls in the interior and western parts of the state ; the proportion of moisture in the form of vapor, snow, and rain, is greater. The degree of cold is sometimes as intense, but not as long continued. The spring is in advance of the interior of the state generally, from a week to a fortnight ; and the frosts, excepting in some particular localities, are not so early, nor severe. For healthiness, as far as this may be determined by the tables of longevity, this county may be safely compared with any part of the known world.

The whole number of acres in Essex County according to the Reports of the valuation committee in 1831, is as follows :

Tillage, ...	Acres . . .	14,113
English and Upland Mowing, ...	" . . .	31,947
Fresh Meadow, ...	" . . .	15,471
Salt Marsh, ...	" . . .	14,139
Pasturage, ...	" . . .	100,309
Wood, ...	" . . .	22,058
Unimproved, ...	" . . .	34,281
Unimprovable, ...	" . . .	10,417
Owned by the Towns or other Proprietaries, ...	" . . .	3,604
In roads, ...	" . . .	6,606
Covered with Water, ...	" . . .	17,176
Total, ...		270,121

The soil of Essex County is of primitive formation ; and of various character. There is a locality of limestone mentioned by the geological surveyor in Newbury and Bradford ; but it is believed of small extent. There is little purely sandy land excepting on the sea-shore. There are extensive tracts of peat bog. The soil on the sea-shore among the projecting cliffs and ledges, on the peninsulas and islands on the coast, with the exception of Plum Island which is almost unmixed sand, is a deep rich loam, highly productive in

grass, corn, oats, and potatoes. On the main eastern road from Salem to the extreme line of the country, there prevails generally a gravelly loam from six inches to a foot in depth ; not difficult to be worked ; and productive under good cultivation. The lands bordering on the Merrimack are much broken ; but the hills are generally rounded, of not difficult ascent, and composed of a rich dark clayey loam. They ordinarily produce good crops of wheat, barley, corn, oats, and potatoes. This variety of soil embraces an extent of three or four miles from the river on the south side. On the west side the land is much more charged with sand, and is not so fertile. With the exception of a considerable tract in Haverhill and an island of fifty acres lying below the bridge in Haverhill, there is no fresh alluvial meadow on the river. The towns in the interior of the county are of various character, in some places presenting long strips and high eminences of rich clayey and gravelly loam ; and in other parts a broken, thin, hungry and stony soil, the cultivation of which is difficult and unproductive. The primitive forests have been long since removed ; but there are extensive tracts of wood in different parts of the county. The maritime parts are principally supplied with fuel by importations of wood from Maine, or coal from Pennsylvania. The interior have a supply from their own wood lots ; or their peat bogs, the value of which is becoming more highly appreciated.

The soil has in parts of the country become exhausted ; and in no part of it can it be advantageously cultivated without manure. The stony and rocky character of the soil is in some places an impediment to cultivation ; but a large proportion of the land in the county is already under partial improvement or susceptible at present prices of labor, while present prices of produce remain, of profitable culture.

The county is well watered ; and contains several ponds of some extent, the scenery in the neighborhood of which is picturesque and beautiful. Some of the situations on the Merrimack and many on the sea-shore are commanding in their position and present views of large extent and great variety and beauty.

The farmers in Essex are particularly favored in respect to markets. Boston is easily accessible to most parts of this county, being from its farthest point not more than forty miles distant ; and the

large commercial and manufacturing towns of Salem, Lynn, Newburyport, Marblehead, Danvers, and Lowell, furnish a ready demand for whatever the farmer will produce. Of the whole population in Essex, there is reason to believe that not one fifth part are engaged, properly speaking, in agriculture. The remaining four parts are consumers not producers. The County of Essex is essentially a commercial and manufacturing district. Besides what may be called marketing, including the selling of hay, she sends no agricultural produce away ; and she imports largely of bread-stuffs, vegetables, dairy-produce, mutton, beef, and pork, together with a great amount of oats and corn for horse-feed. Rye is cultivated to a small extent, and the bread of the population is almost entirely composed of the superfine flower of western New York and the middle States.

SIZE OF FARMS. The average size of the farms in Essex will not exceed one hundred acres, and farms of three or four hundred acres are scarcely to be found. The population of the county becoming daily more numerous, the land is continually undergoing subdivisions ; and a large proportion of the persons engaged in the manufacturing and mechanic arts, are anxious to secure to themselves small parcels of land, for the sake of keeping a cow or raising their own fruits and vegetables.

Farming in the county is scarcely pursued as a distinct or exclusive profession ; but as subsidiary to some other business or pursuit. In this way it has been eminently conducive to health, and productive of innumerable comforts ; but no fair experiment has been made of it under the fair advantages of capital and labor and exclusive enterprise and attention, as matter of pecuniary income and profit.

The Crops produced in Essex County are Hay, English, Salt, and Fresh Meadow ; Corn ; Wheat ; Barley ; Rye ; Oats ; Buckwheat ; Potatoes ; Onions ; Ruta Baga ; Carrots ; Turnips ; and Garden Vegetables. The Beet has been cultivated extensively for feeding cows ; and on a small scale for an experiment in sugar. Attempts were made to cultivate the sunflower for oil. The mulberry has been attempted in some places for silk.

I shall proceed to give an account of these crops.

CROPS.

GRASSES. The grasses usually cultivated are the Herds Grass or Timothy, the Red Clover, the Red Top ; and besides these, experiments have been made with Orchard Grass, Lucerne, Tall Meadow Oats, and Foul Meadow.

The principal grasses on the salt meadows, are black grass, fox grass, and thatch, goose grass, and branch grass.

The usual rotation, where the land is broken up from greensward, is, first, potatoes, which are commonly planted with manure ; the second year Indian corn with manure ; and the third year oats with grass seed. It is then continued in grass at the pleasure or convenience of the cultivator three or four years ; and then again taken up and subjected to the same rotation. Indian corn is sometimes planted two years in succession. Oats being a sure crop, and at once available, are much cultivated, but almost universally disapproved to be sowed with hay seed for the purpose of laying down land to grass. Wheat is preferred to any other crop, with which to sow grass seed. I found one instance in which the land had been laid down with pease. The grass seed had taken perfectly ; and the practice was strongly commended by the intelligent farmer who had made the experiment. The pease would completely cover the ground while growing ; and the coarse stubble would furnish a good protection for the young plants, when exposed by the removal of the crop. The laying down of lands with grass only, or with winter rye in the autumn, is a frequent practice and greatly commended. This is done at a season of comparative leisure in the first part of September ; or, in some cases, after the corn or potatoe crop is taken off ; and the success is almost certain.

The quantity of grass sown to the acre, varies very much with different individuals. I subjoin the practice of some of the best farmers in the country, whose crops are among the largest obtained. (I.) half bushel Herds Grass ; (II.) half bl. h. g. and qr. bl. Red Top ; (III.) three pecks h. g. ; (IV.) half bl. h. g., qr. bl. r. t., 1 pint clover ; (V.) half bl. h. g., half bl. r. t. ; (VI.)

one bushel h. g., sometimes two bushels h. g. In the last case, the land was manured in an abundant manner ; the soil moist and clayey, and highly favorable to herds grass ; and such an amount of seed was sown in order to prevent the crop from being too coarse.

The herds grass seed brought into our market is often injured by being too much rotted ; so that a considerable portion of it will not vegetate. The best method of curing it which I have met with, is to cut it when dry in a good day ; allow it to lay one day and a half ; tie it in bundles ; and set it upright in a barn chamber or on a scaffold, well ventilated ; and where the scattering seed may be saved. Cured in this way, it may be considered worth double the price of that usually offered for sale.

It has been the practice with many farmers to omit sowing clover for a few years past. They are reverting to their former custom ; and sowing a portion of clover with their other hay seeds, as otherwise they get in the first mowing a comparatively small crop from the land ; and they deem it better for the land newly laid down that it should be shaded with clover, which starts immediately after being cut, rather than exposed to the severity of the sun's rays, as it is where only herds grass is sown.

Of the proper time of cutting herds grass, which is the principal grass cultivated in the county, the general impression is, that it should be cut early rather than late ; and that the most desirable time is as soon as the seeds begin to shake off. The buyers in the market require that hay should be bright and green. A very shrewd farmer remarks, however, as the result of his observation, that grass spends much better, when perfectly ripened, than when cut early ; besides that it is then cured at much less expense. The farmers in the interior are in the habit of cutting their grass much later than those farmers who prepare it for market. As far as the tables of the nutritive matter found in different grasses, made by order of the Duke of Bedford, are to be relied upon, it seems that an acre of this grass, when cut at the time of flowering, yielded 1595 lbs. of nutritive matter ; and when cut while in seed it yielded 3668 lbs. of nutritive matter, making a difference in favor of cutting it when perfectly ripe, of 2073 lbs.

What is called the Ipswich hay in Boston is usually of a bright

green, and much esteemed. A great deal that goes under this name is purchased in the neighboring towns and sold by the Ipswich marketers. When taken for sale on commission from Ipswich and Rowley from four to five dollars per ton are allowed ; from Newbury seven dollars. These loads are made up with great care, and frequently contain from three to four tons each.*

The sale of hay is a matter of so much importance to the Ipswich farmers that the greatest pains are taken in curing it. One of the best farmers in the town states, that he gets his hay quite early ; prefers to cut it before it is all in blossom rather than too late ; and never permits it, if possible to be avoided, to be wet by dew or rain. He chooses that it should remain one day in cock. This method is strongly recommended by another farmer of equal skill, who " cuts his grass early, and never suffers it to be wet."

The yield of hay upon an acre is quite various ; and as it would be very difficult to make a general average, I subjoin statements given to me in different towns.

In Salem, 1 ton, 2 tons, $2\frac{1}{2}$ tons to the acre. Beverly, $1\frac{1}{4}$ ton, $\frac{3}{4}$ ton. Manchester, 1 to $2\frac{1}{2}$ tons, $\frac{5}{8}$ ton, $1\frac{1}{2}$ ton, $1\frac{1}{2}$ ton. Gloucester, $1\frac{1}{2}$ ton, 2 tons, 3 tons. Sandy Bay, 2 to 3 tons ; 14 acres produced 30 tons at one cutting. Ipswich, 1 to 2 tons, 2 tons ; 23 acres gave 20 tons. Essex, $1\frac{1}{4}$ ton, 2 tons. Wenham, 1 ton. Hamilton, $1\frac{1}{2}$ ton. Danvers, $1\frac{1}{4}$ ton. Lynn, 2 tons. Methuen, 2 tons. Newbury, $1\frac{1}{2}$ ton. Amesbury, 2 tons. Marblehead, 27 acres produced 57 tons.

I have many other returns, but it is not necessary to submit others. The average product, according to the above, would be about $1\frac{3}{4}$ tons to the acre.

The hay raised in Essex County is a source of great income. The number of stage and livery horses kept in the county cannot fall short of one thousand, besides those kept by private individuals for business or pleasure, who depend on the purchase of hay. The price of hay for the last seven years has fluctuated from twelve to twenty-eight dollars per ton of 2000 lbs. It would not be far from

* The hay and straw brought from Essex County and sold in Boston market in the year 1837, amounted to 2,071,235 lbs. or 1,035 tons, 1,235 lbs. net weight. The amount of straw included in the above, is trifling.

a true average in different parts of the county to place it for that time at sixteen dollars.

The expense of cutting, curing, and storing a ton of English hay in ordinary circumstances is rated at two days and a half of a man's labor.

SALT HAY. A large amount of salt hay is cut in the county. The marshes in Saugus, Lynn, Essex, Ipswich, Rowley, Newbury, and Salisbury, are extensive and productive.

The grasses produced on the salt marshes are various in kind and value. I prefer to give the common names, though these names may be regarded as local and provincial.

Black Grass—deemed the best product; grows on the higher parts of the marsh, where it is only occasionally flooded by the tide; it is often thick and heavy, and it is desirable that it should be cut early. When well cured it is much relished by cattle; and deemed of almost equal value as the best English hay. I have seen this grass growing luxuriantly high up on the upland, where the seed was dropt from the cart; and it would be well worth the experiment to test its value as a cultivated grass in such locations. A farmer in Ipswich is of opinion, that if this grass is not cut very early it should be cut very late, after the season of the fly has passed, which is apt to impregnate it, and occasion maggots in the mow, offensive to cattle. Other farmers deem this a matter of little moment. The cattle themselves ought to be judges in the case.

The next grass is the *Red grass* or *Fox grass*, a very fine reedy grass, abundant and excellent.

The next is *Goose grass*, deemed excellent but not abundant. Sheep it is said will entirely destroy this grass, if suffered to feed on the marshes.

Branch Grass, a short reedy grass, resembling much the fox grass, and by some persons pronounced the same; it branches much and from this circumstance derives its name; it is not abundant but the hay is much valued.

Sedge, a pointed long flat-leaf, grows in low places and on the sides of creeks, much valued when not too large.

Thatch, a grass differing little from sedge, which grows in creeks as high as the tide rises; and is cut principally for litter or manure.

The average product of well managed salt marshes is from $\frac{3}{4}$ of a ton to $1\frac{1}{2}$ ton. The hay is valued at half the price of English hay. In Salem and Boston markets, where it is purchased for a change of diet or to be mixed with English, it usually brings two-thirds of the price of English.

The farmers in the interior of the county, even at a distance of fifteen miles or more from the sea-shore, are glad to own or hire a piece of salt marsh, considering a portion of this fodder of great service to the health of their stock. A shrewd farmer in Lynn considers salt hay as worth five dollars a ton merely to spread upon his grass land for manure. His judgment is to be relied on. It is stated likewise that those farmers, who carry it into the interior in a green state and cure it in their fields, find this process almost equal to a top dressing of manure. This comes undoubtedly from the salts, which it deposits. The quantity of salt hay, which is cut, enables the farmers to sell much of their English hay, without injury to their farms. These lands according to their situation are valued at from ten to fifty dollars per acre. Their value is likely to be much increased in many places from improvements of which I shall speak presently.

Considerable quantities of fresh meadow or swale hay is cut ; but it is composed of aquatic plants, which contain little nourishment ; and is of comparatively little value. The manure of cattle fed upon it or littered with it is of inferior quality.

INDIAN CORN.

The next valuable crop in the county is Indian corn. This plant delights in a warm, rich soil, inclined to sand ; and no plant, if properly managed, affords a better compensation for labor and cost. A good deal of land in the county is favorable to it. The two last years are by no means proper test years of the value or amount of this crop. The accounts, which I subjoin, are of crops raised in many cases in former years, or the judgment of the farmers of the average yield of a town.

Every statement which I present rests upon credible authority; but it is not necessary to refer to names. In Essex the yield is rated at 50 bushels to the acre. Wenham and Hamilton 35 bs. ; Ipswich 30 and 70 bs. ; Old Rowley 50 bs. ; New Rowley 40 bs. ; West Amesbury 30 bs. ; Amesbury 40, 50, 60 bs. ; Salisbury 35, 50, 70, 80 bs. ; Newbury 40, 60, 80 bs. ; Saugus 30, 75 bs ; Manchester 60, 72 bs. ; Gloucester 40, 60, 75 bs. ; Beverly 40, 50 bs. ; Danvers 40, 85, 95, 110 bs. This would give an average of 54 bushels to the acre. The price of corn in the county has now for some time exceeded one dollar per bushel ; and it may be fairly estimated at one dollar when pork is valued at 10 cents per cwt. The best kinds of flint corn weigh 60 lbs. to the bushel.

I found corn in the county which was planted the 10th of June and ripe the 7th of September. Many fields planted the middle of May were fit for harvest the first week in September. A farmer whose premises every where exhibit excellent management writes me that a field of $2\frac{1}{2}$ acres, which I visited, was sound and good, and yielded 280 bushels of ears, equal to 56 bushels of sound corn, to the acre. The largest crop raised, of which I have any return the present year on any one farm is 617 bushels.

Of the expenses of cultivating an acre of corn in this part of the State I have been fortunate enough to obtain only three estimates ; these are from farmers, whose lives have been devoted to agriculture.

Ploughing and harrowing	5 00
Furrowing	1 50
Planting	5 60
Hoeing	5 00
Topping stalks	1 50
Harvesting	5 00
Manure	20 00
	\$43 60

An acre under his cultivation will generally yield from 40 to 60 bushels ;

Say, 50 bushels at 1 doll.	50 00
Corn fodder on an acre	17 00
	\$67 00
Expense	43 60
	\$23 40

To this may be added without serious injury to the corn crop three or four cart-loads of pumpkins and fifty bushels of turnips.

The large charge above made for planting, it is presumed, includes manuring in the hill. He considers the land improved to the amount of half the manure, which would of course lessen the expense, ten dollars.

Another farmer states: "I think ploughing an acre of swarded land with two yoke of oxen and two hands will take something short of a day, cost \$3; to plough old ground, one yoke of oxen and one hand three-fourths of a day 1.50; harrowing an acre of new ground 1.00; old ground 50 cents; furrowing or hoeing 50 cents; planting 1.00; cultivating, harrowing, or hoeing, three times 4.50; topping stalks 1.50; gathering 2.00; husking 3.00; if manured in the hills, say 20 loads of manure, 20.00; making a total on swarded land of 36.50. I call a good crop of corn from 60 to 70 bushels. I have raised 80 bushels. I buy good manure at 1.50 per load." If we rate the crop at 60 bushels at 1.00 per bushel, it leaves a profit of 23.50, and to this is to be added the value of the corn fodder equal to three-fourths of a ton of hay, say 12.00, making the whole profit 35.50. Half the manure in this case should be charged to the next crop.

The estimate of another farmer in Essex County of the cost of cultivating an acre of corn is as follows:

"Half the corn raised in our neighborhood is raised in a course of crops; first year, break up grass land and plant with corn; second year, corn or potatoes; third year, wheat, barley, or oats, with grass seed; then from three to four years in grass. We use from four to ten cords of manure, average eight cords per acre; but only half should be charged to the corn or potatoes.

Four cords of manure are	16 00
Ploughing including team, 3 days work	3 00
Opening holes and putting in manure, 3 days . .	3 00
Dropping and covering, 1 day	1 00
Hoeing three times, 5 days	5 00
Cutting and securing tops, 2 days	2 00
Gathering and husking, 4 days	4 00
	\$34 00

He puts the produce at 40 bushels and values it at \$30, and the fodder at \$8, making \$38.

In this case the produce is less than such cultivation ought to warrant ; and the value of the manure is estimated at a high rate.

This farmer states, likewise, that he estimates the expense of cultivating an acre of potatoes to be the same as an acre of corn, \$34 ; and the produce 240 bushels, deducting 15 for seed, will leave 225 bushels, at 20 cents, equal to \$45. The above estimates he adds are for our stiff loams ; but from light loams and sandy lands I should put the potatoe crop at from 150 to 200 bushels."

The statements above given are from a farmer, who in his extreme concern lest he should make an exaggerated estimate, has certainly underrated the produce of his own fields ; and designs to give the average of his vicinity. It is obvious how greatly the increase of ten or twenty bushels to his corn crop, and one hundred bushels to his potatoe crop per acre, by more liberal and skilful cultivation, would change the results, without increasing the expense of manuring and cultivation in proportion. With less than 50 bushels of corn to the acre and three hundred bushels of potatoes no farmer ought to rest contented.

I add the estimates of a farmer in Middlesex county, whose yield of corn is 55 bushels to the acre ; and who frequently gets 100 bushels of turnips from his corn ground.

55 bushels corn at 1 doll.	55 00
100 bushels turnips at 12 cents, less	
expense of gathering, 5 dolls.	7 00

Corn fodder	12 00
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	\$74 00
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Expenses	40 00
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	\$34 00
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I subjoin also the estimate made by one of our most skillful farmers, the Superintendent of the Farm School, at Thompson's Island, Suffolk county. One acre of corn or greensward :

Ploughing with double team nearly one and a half day at 4 dolls. per day	5 00
10 cords of compost manure one part animal, the other vegetable, well incorporated together, and which should be in a state of decomposition, valued any where within fifteen miles of Boston at 4 dolls. per cord ; one half of which should be put to the corn crop	20 00
Carting on manure with single team 2 days	4 00
Harrowing with single team half a day	1 00
Spreading manure 75 cents ; rolling half day \$1	1 75
Harrowing \$1 ; furrowing one way with horse 75 cents.	1 75
Planting 2 days \$2 ; seed 50 cents	2 50
Cultivating twice in one furrow	1 25
Hoeing first time, 2 days for a man	2 00
Cultivating 2d time, once in furrow	0 75
Hoeing 2d time, one and a half day	1 50
Cultivating 3d time, once in furrow	0 75
Hoeing, 3d time	1 50
Cutting up, and carting in corn, two men and team one day	3 00
Husking and putting away corn	2 00
Shelling by the machine	1 00
	\$49 75

The product of such cultivation is estimated at 70

bushels	.	.	.	.	.	.	.	70	00
Corn fodder at	.	.	.	.	.	.	.	12	00
									82 00
Expenses	.	.	.	.	.	.	.	49	75
Profit	.	.	.	.	.	.	.	\$32	25

Farmers in general estimate the corn fodder or stover upon an acre as equal to three fourths of a ton of English hay ; many consider it as equal to a ton of hay. The only instance of exact measurement which I have met with is from a Pennsylvania farmer. On corn yielding 66 bushels to the acre there was obtained of

	Tons.	Cwt.	lbs.
Blades, husks, and tops	1	6	13
Stalks or butts	1	7	00
Total,	2	13	13 gr's.

The stover of the Pennsylvania corn, which is a gourd-seed variety would probably yield from a third to a half more than ours in weight ; yet our stalks being smaller, more of the fodder in proportion would be consumed by the cattle.

I have dwelt thus largely upon the crop of Indian corn because I deem it among the most valuable crops that can be raised among us. It constitutes a nutritious food for man and beast. With the exception of the clayey, wet, and frosty soils, no crop is more adapted to general cultivation. In the emphatic but just language of a Virginia farmer it is "Meal, Meadow, and Manure." It is a comparatively certain crop. There has been no general failure of the corn crop until within the last two years, since the year 1816, when a frost occurred every month in the year. In the last two years, however, fields have ripened perfectly where an early variety was planted. The Pickwacket corn, an early eight-rowed variety, highly productive and yielding under good cultivation 70 to 80 bushels to an acre, has been sound and good in many places within the county the

present year ; and even in the interior of New Hampshire, from which it was brought. The Dutton or Sioux corn, a large twelve-rowed variety, has likewise ripened in favorable locations. This is a valuable variety abating the size of the cob. We have ascertained by repeated trials, made with as much exactness as the case admitted, that in thickly set ears, the amount of grain upon a large cob bore an equal proportion to the size of the cob, with that found in smaller varieties. The objection to the large cob is the quantity of moisture contained in it, in consequence of which it is liable to become heated and mouldy in the bin, though the exterior may appear bright and sound. It is a crop of lasting value, and may be kept in a sound state for years. I have in my possession an ear of corn grown in 1806, as sound as in the year of its growth ; and some kernels of the same product, planted the last year, came up well. There is no crop, according to its weight, which will produce more beef, mutton, or pork. There is none, where the produce is consumed on the place, which returns more manure to the land. There is none, which may be planted successfully, more frequently on the same land. I know an instance of its repetition thirty seven years in forty, and without any diminution of the product. There is none which affords a better preparation for laying down land to grass, as some decisive experiments, which I shall hereafter detail, will show. There is none, all the processes in the management of which are more simple and certain.

One of the most valuable improvements in the husbandry of the last twenty years is that of planting this crop on an inverted green-sward. The sward is completely turned over after vegetation has considerably advanced. The manure is applied on the top of the soil ; and the field is then rolled in a thorough manner. The ground is next harrowed ; and the corn planted either in drills or hills. When the roots of the corn pierce the sod, they find an abundant pabulum of decayed vegetable matter, equal, by as exact a calculation as can be made, to twelve tons upon an acre ; and the crop is forced on at the last of the season, when it particularly needs this stimulus and food, to great advantage.

It is important in these cases that the sod should remain unbroken ; and where the corn is cultivated on a flat-surface and no hills are

made, the land may be easily laid down immediately to grass, the seed being sowed at the last hoeing ; or it may be thoroughly harrowed after the crop is taken off, and then laid down with winter grain and grass seed. The benefits of the decomposed sod, being thus all secured in the soil, will be felt for a long time ; and the comparatively small expense of this mode of management strongly recommends it.

The importance of this crop to Massachusetts can hardly be overstated. The imports of corn into the port of Boston in the year 1837, amounted to 1,725,436 bushels. Immense amounts were likewise brought into other ports ; but it has not been in my power to ascertain them. At one mill in Gloucester more than 14,000 bushels were imported and ground at one time the last season. I believe that the demand might be supplied within the State, and to a great profit.

That an average of 8,000 bushels of Indian corn should be produced to every town in the Commonwealth would not be demanding too much. In several of the towns on Connecticut river ten farmers can be found, who themselves produce this quantity. This production would require only, that in every town, forty farmers should cultivate each four acres, yielding, under good cultivation, 50 bushels to the acre. In one of the most forbidding localities of the Commonwealth, in Windsor, Berkshire County, among the mountains, 116 bushels have been obtained from an acre. If this were done, at 50 bushels to an acre, the corn crop, under favorable circumstances, through the State would yield 2,400,000 bushels, worth as many dollars, when pork is worth ten cents and beef seven cents. The value of the corn fodder in such case, valuing it only at \$5 per acre for fodder, leaving out all estimate of it for manure, would amount to \$240,000. There is no reason, in any but the most impracticable situations, why every farmer should not cultivate his ten acres ; and why many of them should not cultivate their fifty acres. No crop requires a less outlay for seed. It was said by the celebrated Arthur Young, that a country capable of growing Indian corn is singularly blessed above others.

WHEAT has sometimes been raised in this county with success.

Until within the last two years, the town of West Newbury has always raised a sufficiency for its own wants ; and some for sale. Good crops have been produced in some places in the county this year. In Newbury, two acres produced fifty-seven bushels of sound grain. This was the Black Sea wheat. In another instance, 32 bushels and 14 quarts were obtained from an acre. In Lynn, a good crop of 20 bushels to the acre was obtained. In Haverhill a crop of 25 bushels to the acre. In Ipswich likewise there have been good crops. In Gloucester, a small piece of land yielded at the rate of 24 bushels to the acre.

The crop can hardly be considered as an established product of the county ; and the amount raised at any time bears an inconsiderable proportion to the wants of the population. There are parts of the county, especially the northeastern, where the soil is clayey ; and where, by proper management, it may be cultivated to advantage. A farmer in Newbury states, that “ he has raised wheat and rye on his farm since the year 1812, and has found no difficulty except in 1836.” This year his crop was excellent, yielding more than 26 bushels to the acre. He adds, “ I have always sown wheat on ground in good condition ; and, at the same time, have laid the land down to grass ; and I have thought the roots of wheat decomposed soon, enriched the ground, and were better for the grass than full sowing without the wheat. I have always sown spring wheat ; and in 1836, sowed Black Sea wheat. It came up mixed as to kinds, but of a good quality. I sowed the wheat I raised last year in 1837, and it was good in quantity and quality.”

1. Wheat is still, however, regarded as an uncertain crop. Some portion of lime in the soil is deemed essential to its success. Soils, containing only one hundredth per centage of lime, are found capable of bearing wheat. In this county, this can be procured only at considerable expense. The value of lime to corn is almost as great as to wheat, though to the latter crop, some measure of it is indispensable. The prospect that the cost of lime will be considerably reduced, by cheaper methods of burning it being employed in the great lime depositories in Maine, leads to the hope that it may be more accessible to the Essex farmers. The use of ground bones, which will soon be extended, will, in some measure, supply its place.

Great quantities of clam and muscle shells, which are furnished by the fisheries in the town of Essex, could they be reduced by fire, would prove of considerable service. As yet the use of lime as manure in the county is very little understood ; and further experiments are important to determine at what rate a farmer can afford to purchase it. A considerable deposit of shell marl is reported to have been discovered on the route of the rail-road, now in progress between Boston and Salem. The discovery has been so recently reported, that no examination has been made of it.

2. A second cause of failure is supposed to be connected with our climate. The blights or shrivelling of the kernel, which sometimes occur, are in some cases occasioned by the want of lime in the soil, in order to perfect the grain. Where these blights are directly connected with atmospherical influences, they can be but partially guarded against by any human skill ; but in this respect they are not so frequent as to discourage the cultivation. There has not been a general blight of the wheat crop in Great Britain since the year 1806.

Of two contiguous fields of wheat, similar in aspect, condition of soil, and kind of seed, which I visited this season, one was severely blighted ; the other sound and perfect. The only difference ascertainable in the management of the two fields, was that one of the farmers, during the continuance of the heavy dews, and damp foggy weather, which occurred while the wheat was in flower, was careful every morning to sweep the dew from his wheat by passing a rope over it. Another farmer in Manchester reports his having pursued this practice in former years with his wheat, and with success.

3. A third cause of the failure of the wheat crop in several places in the county, is the grain worm. The Hessian fly, which formerly infested the wheat, has, in a great measure, disappeared. The grain worm, whose habits are not yet well understood, threatens great injury throughout the country. The fly, from which the worm originates, deposits his egg at the time the wheat is in blossom. This small black fly is seen at that time hovering over the fields of wheat in infinite numbers. Some remarkable experiments have been made by a free dressing of newly slacked lime upon the plant, while it is in a wet state, to destroy his deposit or prevent his approach. There

is some reason to hope, that if seasonably and properly applied, this may prove an effectual remedy. A farmer in West Newbury states, that he this year made the experiment of liming his wheat field, having applied at least one bushel of newly slacked lime to an acre ; and that his grain was comparatively free from the insect, while the adjoining fields of his neighbors were severely injured. The subject of the worm is of such great importance as to deserve the most anxious inquiry and exact and repeated experiments. In some parts of the country, late planting seems to have carried the season of flowering beyond the period of the insect, and his ravages have been prevented. This insect has been known in Great Britain since the year 1828, but the cultivation has not for that reason been abandoned or lessened.

The expense of cultivating an acre of wheat may be thus stated. Ploughing, \$2.50 ; 2 bushels of seed, \$4 ; sowing and harrowing, \$1.50 ; harvesting, \$2.50 ; incidentals, \$1 ; total, \$11. No charge is here made for manure, which is applied to the preceding crop, but half of which certainly belongs to this crop ; nor for lime, where any is used. The straw will fully pay for threshing and cleaning. This is customarily given, where there is a threshing machine ; but it is a bad bargain for the farmer. The crop may be estimated at 18 bushels ; and when flour is at \$8 per barrel, the wheat may be valued at \$1.50 ; the produce, \$27 ; the expenses, \$11 ; profit, \$16.

The average product of wheat in Great Britain, is 18 bushels to the acre ; of New York, 23 ; of Virginia, 7 to 9 bushels. New England has no fixed average, as for several years past, excepting the last, the crop has been to a considerable degree abandoned. Wheat is much valued, as a crop with which to sow grass seed, by all who have practised this mode of laying down land to grass.

The farmers on Long Island, have been accustomed to send to towns on our sea-shore, to Marblehead for example, to purchase for their wheat fields, our leached ashes, at 10 cents per bushel ; these contain a good deal of lime, which had been used by the soap boilers. They ascertained that there was an advantage in it. It is known likewise, that foreign agents are visiting different towns and places on the sea board, to purchase the refuse bones, and the animal carbon, after it has been used by the sugar refineries, in order to en-

rich the wheat fields in Europe, which have been for the last two years, to a considerable extent, and to our great disgrace, the granaries of the United States.

RYE can scarcely be said to be cultivated in Essex County. In Salisbury, on poor land, 7 bushels are given as the produce of an acre. In Wenham, 15 and 16 bushels. In Manchester, 12 bushels. In Saugus, 18 to 25 bushels. A small farmer in Gloucester, whom I induced to measure and report exactly the produce of a small rye field, returns $9\frac{1}{2}$ bushels rye this year on 37 rods of land. A considerable amount of rye was formerly raised in the upper parish of Beverly, but the cultivation was for a time discontinued. It has been revived, and it is calculated 1000 bushels have been raised there this year. In Amesbury, and the northern parts of the county, it is represented as subject to blight. The cost of cultivating rye differs little from that of wheat, excepting in the price of the seed ; of which only half the quantity is sowed to an acre, and that of half the value of wheat. The general impression is, that as much wheat can be grown to an acre as of rye ; and the chance of success is as great for the wheat as the rye. In such case, the crop would of course be of double the value. Justice is seldom done to this crop. Land, which is considered too poor for any other crop, is consigned to rye without favor or affection. Under good cultivation in Gloucester, 31 bushels weighing 62 pounds to the bushel, were obtained in 1836. I am assured, on respectable authority, that 70 bushels have been obtained from $1\frac{1}{4}$ acre in the parish of Sandy Bay ; and the ensuing year, from an acre of this land, the remainder being appropriated to turnips, 40 bushels were harvested. Of the extraordinary success in Haverhill, in cultivating rye by ploughing in green crops by which $46\frac{3}{4}$ bushels were obtained from one acre and thirteen rods, I shall subjoin the cultivator's particular account in the Appendix, as a remarkable and instructive example.*

Rye straw is always in demand in the large markets for stable litter, and for beds. I have known it sold as high as \$8, \$10, and \$12 per ton. It is often used to be cut up and sprinkled with meal for horse feed ; and in this way to a degree, it is used with equal

* Appendix E.

advantage as hay. It appears to be necessary that a certain volume should be given to the feed rather than that the feed however nutritious, should be given in a concentrated form ; but it is not believed that there is much nutriment contained in the straw itself. I know of no experiments made to ascertain the amount of rye, wheat, barley, or oat straw upon an acre ; but where the crop of rye is equal to twenty bushels, it would be fair to estimate a ton. This, at the prices which it usually commands in the vicinity of large towns, will nearly or quite pay all the expenses of cultivation. A certain quantity of rye, for fattening beef or pork, is of equal value with any grain that can be given. It is an excellent feed for horses mixed with cut fodder. It is superior to any other feed to be given to milch cows for promoting secretions of milk ; and it is a crop that deserves much more attention than it commonly receives. One of the best farmers in Hamilton says, he always succeeds with rye if put in early.

BARLEY is cultivated in many parts of the county to advantage. Some few years since, owing to the importation of some barley from Holland, by a brewer in Newburyport, an insect was introduced which for several years destroyed the crops. The cultivation was generally suspended for a time, and the insect has disappeared. The crops reported to me in different towns in the county, are as follows: in Manchester 20 bushels to an acre ; Gloucester 26 bs. ; Essex 30 bs. ; Ipswich 30 bs. ; Amesbury 20 bs. ; Salisbury 30 bs. ; Andover 54 bs. On one farm in Danvers 220 bushels have been raised this year, averaging $27\frac{1}{2}$ bushels to an acre. In Beverly, 633 bushels have been raised on one farm this year, averaging 38 bushels to the acre. At 30 bushels to the acre, barley is a valuable crop. For fattening swine, it is considered by many good farmers, of equal value pound for pound with Indian corn. To horses it is injurious. At Danvers Alms House, it is made to supply the place of rye and wheat, and makes an agreeable bread.

The price of barley is seldom less than 70 cents, and rarely over \$1 per bushel. The seed sown upon an acre is usually 3 bushels. The straw is not of equal value for the market as rye straw ; but considered better for the feed of cattle as it is softer. The expense of cultivation and harvesting, may be estimated, exclusive

of the seed and manure, at \$8 to \$10 per acre. It is considered as an exhauster of the soil ; and is not to be chosen for the purpose of laying down land to grass ; the crop being usually cut close with a scythe, the stubble affords no protection to the young crop.

A new kind of barley has been introduced into West Newbury, called by some, the Wheat, by others, the Naked Barley, because it separates easily from the husk. Its yield is said to be equal to that of other barley ; and its flour to be superior. It has been cultivated but not extensively, in the interior of the state. By Davy's tables, barley meal contains a large proportion of nutritive matter, being 920 parts in 1,000 ; 790 of mucilage or starch ; 70 of sugar, and 60 of gluten.

OATS are considerably cultivated in Essex County. The crop, however, is not large. In Danvers 40 bushels to the acre ; Methuen 30 bs. ; Amesbury 30 bs. ; Wenham 25 bs. ; Ipswich 25 bs. ; Hamilton 30 bs. ; Rowley 25, 30 bs. ; West Amesbury 30 bs. ; Salisbury 25 bs. ; Newbury 30, 50 bs. ; Andover 50 bs. ; Lynn 50 bs. This would give an average of 33 bushels to the acre.

The expense of cultivating, is thus calculated by an experienced farmer in Newbury, who estimates his crop at about 50 bushels to the acre :

Ploughing \$1.50 ; harrowing \$1.50 ; harvesting \$2.50 ; threshing and cleaning \$5.00 ; seed 3 bushels ; if sowed alone, 2 bs. if with grass seed, say \$1.50 ; total \$12. This yield considerably exceeds the average through the country. The expense of threshing is much too high. The general price of oats per bushel is 50 cents. The last year has been an exception ; and when hay is at \$20, and corn at \$1, they will generally command 62½ cents. The farmers disapprove the use of them as a crop with which to lay down land to grass ; and yet they are much used in this way. They are general favorites because the cultivation of them is easy ; and it is thought they will put up with almost any treatment. One great difficulty in the way of cultivating them is their liability to blight, especially where the land is rich and highly manured. A kind of oats cultivated in the central and northern parts of this county, and known by the local name of Kilham Oats, from the gentleman, who, it is said,

introduced them from abroad, has hitherto not been known to be blighted, though it has been cultivated here for some years. Its weight is about 33 pounds to the bushel ; its yield to the acre as good as others.

The Tartarian, or as some call it, the Horse-Mane Oat, from the grain hanging together on one side of the panicle, is sometimes cultivated. Its straw is stouter than the common oat, and, perhaps, less likely to be lodged. It is as productive as the common oats ; but it is not thought to possess any decided advantage over them.

BUCKWHEAT. The Tartarian, or smaller kind of buckwheat, has been recently introduced into the county. It is known under the name of Indian Wheat. It has been cultivated in Beverly, Wenham, and Lynn. It does not demand a rich soil ; may be sowed about the 10th of June ; and may be expected to yield under good cultivation, from 35 to 50 bushels to the acre from 12 to 16 quarts sowed. Much larger crops have been reported. It weighs 49 or 50 pounds to the bushel ; 25 lbs. and by close milling, 35 lbs. of flour have been obtained from a bushel, which makes fine cakes, when eaten warm ; and quite tolerable bread. It forms a valuable feed for stock ; and the cultivation of it may be extended to much advantage.

POTATOES. The next principal crop cultivated in the county, is potatoes. This crop is cultivated more or less on every farm, principally for marketing, but in no case very extensively. One farm return, gives 1300 bushels raised, which is probably as large as any in the county.

The yield is rated in Wenham at 150 bushels ; Rowley 75 to 200 bs. ; Amesbury 300, 320 ; 400 bs. common on one farm ; Salisbury 100, 200 bs. ; Newbury 250, 300 bs., Saugus 150, 200 bs. ; Manchester 260 bs. ; Sandy Bay 300 bs. ; Beverly 200 bs. ; and on $4\frac{1}{2}$ acres this year 278 bs. to the acre ; Haverhill 400 bs. The kinds raised are the August whites, a very early variety ; the English whites, a round potato ; the Biscuit potato, a round potato with a brown rough skin, mealy and productive ; the La Plata,

or long red, well known ; and the Chenango, sometimes called the Mercer, or Pennsylvania Blue. These last are early and large bearers ; and command a good price in market.

The amount of seed varies from 6 bushels to 25 bushels. All are agreed that the seed should be large and fair. The point so much debated, whether the potatoes when planted, should be cut or not, remains undecided. The majority of the farmers plant in hills $3\frac{1}{2}$ feet apart ; but most of them admit that they are able to obtain larger crops in drills. Excellent crops have been grown where the whole work was done by the plough ; the land was furrowed, and the seed dropped in the furrow, and then covered with the plough. They were afterwards cultivated with the plough only. When ripe, the plough was passed through the drill, and the potatoes thrown out ; the field was afterwards harrowed, which brought all the remaining ones to the surface ; and was thus left in a thoroughly pulverized and neat condition for a grain or grass crop.

It is the custom of one farmer to cut the seed end from his potatoes, in the winter at his leisure, for planting and use the other part for his swine. In this way a considerable saving is made.

One farmer has obtained three crops of potatoes from the same tubers, by plucking the sprouts, and planting them ; and availing himself of a hot bed to forward the growth.

By recent exact experiments in Great Britain, it seems decided that no advantage comes from planting whole over cut sets ; and that deep planting is unfavorable to the product ; as a potato planted an inch under the surface will produce a greater number of potatoes than one planted at the depth of a foot ; much earthing up of potatoes therefore is not approved. The advantage of plucking off the buds of the potato before they unfold themselves, instead of suffering them to remain until the balls are formed, is to increase the product one sixth.

“Potatoes may be preserved by being rasped or ground to a pulp, and afterwards pressed with a heavy press, and then dried like cheese. Potato cakes of this sort have been found to keep perfectly sweet for years ; and it is thought that ships bound on long voyages, might find it advantageous to take their potatoes in this form.”

Land of a calcareous nature produces the best potatoes. Clay land produces those of a poor quality. Gypsum in the hill is generally supposed to improve both the quality and the product.

I have no estimate of the expense of cultivating an acre of potatoes in Essex County except the one given on page 22. If we suppose the amount of seed used to be 20 bushels, and that the digging is at the rate of 30 bushels to a day's work, the expenses will not much fall short of \$50, including ten loads of manure at \$2 per load. The crop in such case, with ordinary success, may be rated at 300 bushels. The price is seldom less than 25 cents, and rarely exceeds 40 cents in quantities. Potatoes return nothing of value to the soil. Wheat, within my own observation, has done extremely well after potatoes. Potatoes are best grown in a deep rich loam ; and will well repay good cultivation.

ONIONS are a considerable crop in the county ; the cultivation as a field crop has been principally in Danvers and Newbury. Of late they have been subject to a blight, which reduces the value of the crop, and sometimes renders it worthless. Neither the cause nor preventive is understood. In Danvers, until the two last years, 25,000 bushels a year have been raised ; the last year, two thirds of that amount. They are sold in the market to be shipped to New Orleans or the West Indies ; and the price varies from 30 to 67 cents : 300 to 400 bushels to an acre may be considered a fair crop ; 600 bushels are sometimes obtained. The estimate of the cost of cultivation, which I have obtained, is fifty days' labor to an acre. This includes nothing for manure nor rent of land. The manure very generally applied, where attainable, is muscle-bed, which is obtained in Salem at the rate of \$1 per horse load ; and laid in heaps on the land in autumn, where it is completely pulverized by the action of the frost.

In Weathersfield, Connecticut, it is well known that this vegetable has been extensively and profitably cultivated for years ; and mainly by female labor. After the land is ploughed, manured, and fitted for the seed the whole labor is performed by women, even to fitting the crop for market ;—formerly in successful seasons \$100 or more was not an uncommon result of a woman's summer labor in the

onion field. We should be sorry to see women in our country subjected to the severe and degrading services and toils, to which the wives and daughters of the agricultural laborers of the old countries are accustomed. But exemption from all necessity of bodily exertion is usually a curse not a blessing ; and many of the lighter kinds of agricultural labor would be as proper for women as for men, did not custom forbid it, a custom of at least questionable utility. Rather than engage in this many of our young women quit their parental homes, and prefer passing months and even years in heated rooms amid the dust and confinement and deafening din of machinery, to the light but cheerful and invigorating labors of gardening and agriculture, in the pure and bracing air and the green and open fields. The culture of silk promises to afford a healthful and profitable occupation for female labor.

Of the other crops there can be said to be no general cultivation. Ruta Baga, Carrots, Beets, and Cabbages have been sometimes extensively, and continue in some degree, to be cultivated, but not to any noticeable extent. In this respect we believe the Essex farmers have not yet come to a perfect understanding of their true interest. There are three sorts of farming. The first, where agriculture is pursued as subsidiary to something else, and is a mere accompaniment to a trade, business, or profession. The second, where a bare living is sought for ; and men are satisfied with the ordinary supplies and comforts of a farm without any view to improvement or gain. These two classes may be said to comprehend the greater part of the agricultural population of Essex ; and their situation is almost universally comfortable and independent. The third class is, where agriculture is pursued like any other business in the community with a proper outlay of capital and labor, and with a main view to pecuniary advantage. From the number of markets accessible in the county, and the amount of manufacturing population within and in the vicinity of the county to be sustained, this class is destined to arise ; and when this is the case the cultivation of green crops and esculent vegetables will form an essential part of the rotation of products.

I shall here subjoin a list of remarkable products, which have

been obtained in the county, many of which have been certified under oath to the Massachusetts and Essex Agricultural Societies; others have come under my own personal observation, or rest upon testimony so well authenticated that it is difficult to reject it. Where the products themselves have been actually measured, and the land on which they were grown measured, and the whole certified by the asseverations and oaths of persons, whose credibility is unquestioned, I am at a loss to know by what right or reason these statements should be distrusted. The authorities are at the service of those persons, whose curiosity would be gratified by knowing them.

Of WHEAT, 24, 25, and 32 bushels to the acre.

Of INDIAN CORN, 70, 72, 84, $90\frac{1}{2}$, $90\frac{3}{4}$, 105, 110, $113\frac{1}{2}$, 115, $117\frac{1}{4}$ bushels.

Of BARLEY, 50, $51\frac{1}{2}$, 52, 54 bushels.

Of RYE, 40, 56 bushels.

Of OATS, 1,000 bushels on 20 acres.

Of POTATOES, 400, 484, $518\frac{1}{2}$ bushels.

Of CARROTS, 849, 864, 878, and 900 bushels.

Of MANGOLD WURTZEL, 924, and 1,340 bushels to an acre at 56 lbs. to a bushel.

Of BEETS, 783 bushels.

Of RUTA BAGA, 688, 903 bushels.

Of ENGLISH TURNIPS, 636, 687, 672, 751, 814 bushels.

Of ONIONS, 651 bushels.

From one acre of land upwards of three tons of well cured Millet were obtained.

From one acre of redeemed meadow $4\frac{1}{2}$ tons of English Hay were weighed and sold in 1836-7.

From six acres of land more than 29 tons of good English Hay, weighed at the town scales, have been cut in a season.

Six hundred dollars worth of Winter Squashes were sold the last season from two acres of land. The number of pounds is not ascertained. The market price was very high.

The products of an acre and a half in a garden, the present season, are worthy of notice.

The land was manured with eight cords of manure to the acre, and there have been grown on it for sale, and to be sold, as follows :

3,500 bushels of Onions, at 5 cents	. . .	175 00
45 barrels of Beets, at \$1.50 per barrel,	. . .	67 50
Cabbages sold		100 00
14 bushels of Parsnips		10 50
2 do Beans		4 00
20 do Potatoes		6 67
		\$363 67

Besides a supply of vegetables for family use from the same garden.

The establishment with which the last account is connected presents one of the most beautiful examples of persevering industry, and admirable domestic economy and management, to be met with in our industrious and frugal community. The individual began his married life with only \$500, which was the dower of his wife. He has never been the owner of more than 10½ acres of land, but has often hired land for improvement. His whole and exclusive business has been farming. He has been blest with ten children, of whom seven are sons, and all of whom have been brought up in habits of useful industry and had the advantages of a useful education. His house is handsome enough to satisfy any reasonable ambition ; and his out-door and in-door establishments patterns of neatness and order. He has all the needed comforts and luxuries of life ; and in property may be pronounced independent. The habits of such a family are in themselves a fortune. He and his two sons have this year cut and cured 75 tons of hay ; and better hay is not to be found.

THE DAIRY.

Under this head may be placed the milk establishments in the neighborhood of Salem for the supply of the city. In some of

these 30 cows are kept ; in some 40 or more. By an observing and experienced milk man, the average produce of a cow, well fed, was rated at five beer quarts per day ; by others at one gallon. In the former case the customary allowance to each cow during the winter was two quarts of Indian meal, and one peck of vegetables per day, and as much good hay as they required. This farmer judges from his long experience that each cow would require two tons of hay in a season. In summer their feed was good pasturage ; and when that failed, Indian corn, which was planted to be fed to them green. In one year from 23 cows he sold \$2,100 worth of milk, at 5 to 6 cents per quart.

He has found potatoes highly useful for increasing the quantity, but not for improving the quality of the milk. Other milk men speak of trials with the common blood-beet for the feed of milch cows with great advantage. The cows are dry upon an average about eight weeks, and the calf is usually killed or given away as soon as the milk is fit for use.

The use of shorts, wheat bran, mashed or grated potatoes, and cut feed mixed, have been found valuable ; and increased economy in the consumption has been deemed a full compensation for the extra trouble of preparation. The consumption of food by a dry cow is much less than by a cow in milk ; but the length of time during which cows are out of milk is a great deduction from the profits of a milk establishment. In the best managed New York milk establishments, with which I am well acquainted, they feed their cows well, and as their milk declines they increase this feed ; they keep them in milk as long as they will pay well for their keeping, not suffering them to take the bull ; and then they dry them off at once. After three weeks extra feeding they are fit for the butcher, and are sold as beef. This management they consider much better than to keep many dry cows. This method would not be so practicable here. It is more easy there to obtain milch cows when wanted than here. A demand here, however, might create a supply.

At the Theological Institution in Andover, and the same practice is proposed to be pursued at the farms connected with the English and Latin schools in the same town, a considerable number of cows, kept for the purpose of supplying the students with milk, are

soiled on green food. Grass is cut for them ; and particularly oats which are cut green. The experiment is thus far satisfactory. Indian corn sowed either in drills or broadcast, but much better in drills, furnishes an excellent article for this purpose. The cultivation of Ruta Baga, Carrots, Beets, and Cabbages, from their tops and leaves in the autumn as well as from their roots in the winter, would furnish a great amount of valuable feed. The cows are every day turned out for some hours into a small enclosure. The quantity of manure obtained in this way, especially where proper pains are taken, is of a superior quality, and is an important consideration.

Of Dairies for the manufacture of butter and cheese, there are none within my knowledge in the county, of any great extent. Ten cows constitute the largest number reported to me as kept for this purpose ; and these are devoted mainly to the making of butter, for which there is always a ready sale in the towns. It requires a gallon of new milk to make one pound of cheese. From two and a half to three gallons are required for a pound of butter. The cheese usually brings 8 or 9 cents. The butter 20 to 22 cents. Ten quarts of good milk will ordinarily produce a pound of butter. When cheese is worth 9 cents, butter should be worth 22 cents ; the value of the milk then applied in either way is about the same. The skimmed milk and the butter milk, however, are of much more value for various domestic purposes, and for feeding swine, than the cheese whey. The labor of the manufacture is not very different. The care of the cheese, where it is kept through the season, is considerable. The butter finds usually an immediate sale. In the warmest part of the season cheese is principally made. There are no spring houses in the county, such as are universal in Pennsylvania, designed exclusively for keeping the milk, and with running water passing through them. From the want of these accommodations the making of butter in summer is often discontinued.

The yield of a cow in milk is stated generally at 350 gallons per year ; of butter 87½, 116, 140, lbs. ; of cheese I have been able to obtain no return on which I could place reliance. These returns are very small ; and indicate either poor stock, or poor pastures, or poor management. I am inclined to think the returns much under estimated. I have the returns of a dairy of six cows, which I have

often visited, where in 1830, 181 lbs. of butter were made to each cow, and this without any extra feed. In another case, from four cows by high feeding, 208 lbs. of butter were obtained in a season to a cow. Such examples ought to stimulate efforts at improvement.

I am struck often with the remarks made by persons, who are disposed to speak well of their cows, when after stating what they produce, they finish by saying, "but we give them nothing but grass or hay," as the case may be; and "they go in a very poor pasture." This may be very reputable to the cows, but it is very disreputable to their owners. A poor cow is not worth keeping; but no animal will better pay for liberal treatment than a good cow. Why should one of the kindest and most liberal benefactors, which divine Providence has given to men in the form of a quadruped, be treated in this negligent and niggardly manner?

It cannot be denied that a great part of the butter made in New England, is of an inferior quality; and bears a disadvantageous comparison with the butter of Pennsylvania and New York. There is a freshness and delicious flavor to be found in the Philadelphia and much of the Goshen butter, which is rarely, though sometimes, to be met with in ours. It may depend somewhat upon the feed; somewhat upon the animal herself; but I believe oftener upon the management. I shall be pardoned for speaking of some remarkable but not uncommon faults. The cream is often kept too long. The milk room is not always well ventilated and white washed; and is frequently in the neighborhood of the effluvia of decayed vegetables, and musty cider barrels; and is often made the depository of the remains of the dinner table, cider, pickles, cold meats, and various unmentionables. The milk and dairy room, should be exclusively for milk and its products; and by itself. Cleanliness in every part of it, in every vessel, in every operation connected with it, and in every person permitted to enter it, should be the first and an indispensable requisite.

The color of butter depends, doubtless somewhat, but not entirely, upon the management of the milk and cream. The bright golden surface, sparkling like a piece of rock candy or loaf sugar, is altogether preferable to a slimy, waxy appearance, or a cheesy whiteness, which it often has. A lady in Boxford, whose own butter showed

that she understood the art, told me that she knew two neighbors, each owning one cow, who engaged to use their two cows together alternate weeks. The cows went in the same pasture. One of these persons, in the week when she milked the cows, produced from them a beautiful yellow butter ; the other, in her week, from the same cows, produced butter that was white and crumbling like cheese. The former kept her milk in a well aired room above ground ; the latter kept her milk in the cellar. I had no opportunity of making further inquiries, and I am not prepared to say that this was the occasion of the difference ; but it is a strong circumstance. The main point is a pure atmosphere and perfect cleanliness in every operation and utensil.

I shall subjoin here the suggestions of a respected friend in Maine ;* a gentleman who yields to no one in agricultural intelligence, zeal, and experience.

“ Take one quarter or even one third of the milk of a cow—an equal quantity from each teat ; use this in your family or for your pigs—and milk the residue for the dairy. You will make better butter in less time ; and *nearly an equal quantity.*”

I have been long of an opinion, that a winter dairy for making butter in Essex County, where access to market is so easy, would be quite profitable. In this case it would be necessary to have the cows come in in the fall ; and to be prepared with an abundance of succulent food for them, such as carrots, beets, or ruta бага, through the winter. The stables, too, should be warm and comfortable. An experienced dairy woman says, she finds no difficulty in making butter at any time in winter, provided she heats her cream on the stove to 72° Fah't., and scalds her churn with boiling water when her cream is put in. Such a dairy, on many accounts, would be managed with less trouble than in the warm season. The butter could be sent to market in the best condition ; and, if well made and known to be new, would always command a quarter to a third more than the ordinary price.

* Charles Vaughan, Esq., of Hallowell.

SHEEP HUSBANDRY.

This branch of agriculture is comparatively a small concern in Essex County. The whole number of sheep in the county, according to the Statistical Returns, being 6252 ; Saxony, 10 ; Merino, 928 ; of other kinds, 4879. The Saxony are represented as yielding 3 lbs. to a fleece ; the merino, $2\frac{1}{2}$ to 2, 11 oz. ; the common sheep, 3 and $3\frac{1}{2}$ lbs. The experienced shepherd will receive the returns of the yield of Saxony sheep in wool with some hesitation, but in this case, they are not of great importance. The county is not adapted to the raising of fine wooled sheep for their wool only ; and no one thinks of the Saxony for mutton.

In several parts of the county, however, a small number of sheep are kept for early lambs, and to great advantage. Where other stock is kept on a considerable scale, a few sheep may be kept at little or no expense, upon the orts and wastings of the other cattle. A farmer, whose management is excellent for its success and frugality, in another county, writes to me : “ Any farmer may keep a few sheep with but little cost ; say as many sheep in number as he has of cattle and horses. In fair weather they require nothing but the orts, sticks, and leaves, which the other creatures leave. By giving them a small quantity of corn daily, I am confident that in this way I have kept ten sheep on two bushels of corn, or a pint a day, with the addition of four or five hundred of hay at most, to be given in bad weather and in the spring. In this way I have as good or better sheep than my neighbors. Sheep will fatten in this way.”

There seem to me two ways in which the sheep husbandry may be pursued in Essex County to great advantage. The first is in fattening wethers for the market. It is better for the farmer to consume his hay on his farm, when he can obtain for it \$15 per ton, than to sell it in the market for \$20. I believe, in general, with ordinary skill, a farmer in any part of Essex County may do this by fattening wethers. In this case, his ton of hay may be expected to give him nearly a cord of valuable manure ; and all the expense and trouble of going to market, to say nothing of the loss of time and the vexations. I will suppose him to purchase a good lot of wethers,

which he shall commence with on the first of December. For these he pays three dollars per head. They will require on an average for twelve weeks, two pounds of hay per day, at \$15 per ton or 1½ cents per lb.—\$1 26 ; and one pint of Indian corn per day, say at 96 cents per bushel, or 1½ cent per pint—\$1 26 : total cost, \$2 54. This is liberal feed ; and by the first of March his sheep will generally bring him \$5 50 to \$6. If they are of superior quality, and have had more liberal feeding, they will generally bring in proportion. The attendance is easy, and goes into the general farm labor. If an Ipswich or Rowley farmer sends his hay by an agent to be sold in Boston market on commission, he pays from \$1 to \$7 on the sale of it, and the manure is lost. If the Essex farmer will go largely into the raising of ruta бага, he will be able to fatten his wethers at a less expense than we have charged ; and if he will in such case litter his sheep yards abundantly with meadow hay, ferns and brakes, straw, corn butts, or peat mud, he will find a mine of wealth in them in the spring, whose diffusion will spread its golden harvests over his fields. There is no article of feed, which can be given to cattle, which will produce such large secretions of urine as turnips ; and a compost formed in the way described is among the most active and productive manures, which can be applied to the soil. In such experiment the farmer needs, however, to be admonished to undertake it only with sheep in good and thrifty condition. It is a proverb that a sheep is never fat but once ; and attempts to fatten a poor sheep will usually end in disappointment. The second important point is to observe the strictest regularity and care in feeding. I speak on the subject of fattening wethers with some confidence, having had many years of careful and exact experience. The near vicinity of the Essex farmer to a market for his mutton gives him great advantage over one living far in the interior.

A second branch of sheep husbandry, which the Essex farmer may prosecute to great advantage, is the raising of early lambs for the market. I mention one example which may seem trivial, yet a feather may indicate the course of the wind as certainly as a ship under full sail. A farmer in Ipswich had a lamb come on first of January last. He fed the ewe with plenty of succulent vegetables, and he allowed the lamb to have free access to Indian meal, of

which he soon became fond, though the whole amount he consumed was trifling. On the 20th of May the butcher gave him \$4 for the lamb, which weighed 9 and 10 lbs. per quarter. Another farmer this last season from 30 sheep sold 24 lambs at \$3 each. Another, from 30 sheep sold lambs to the amount of \$75. Another from 12 ewes sold 18 lambs at \$2.50 cents each.

I subjoin the account given to me by an exact farmer. "Five years ago he bought 6 sheep for \$2 per head. From these he sold 6 lambs at \$2 each. He considered the wool as paying for the keeping. The sheep sold in December of that year for \$25.50

Four years ago he bought 12 sheep but did not do so well because he did not sell the old sheep; the lambs sold for more.

Three years ago he had 25 sheep. The experiment in the sale of the lambs did well.

Two years ago he had 50 sheep; for 40 lambs he received \$100, for 4 lambs \$8—\$108; for the wool at 48½ cents per lb. he received \$73. Total proceeds, \$181. He kept the stock.

This year he had 47 sheep. They gave him 33 lambs, and besides these 7 lambs died. The lambs brought \$2.25 each. They did not come until April."

It is important in such cases so to arrange matters that the sheep should lamb early; and to have plenty of ruta бага or best of hay in store for them while in milk. Potatoes for feeding the ewes are said by some farmers in Berkshire to be in such case injurious. The difficulty is in keeping a stock of ewes through the summer. This might be very inconvenient in some locations, especially as the fences in general in Essex are not suited to this kind of stock. The farmer might provide, therefore, to drive his ewes to a pasture in the interior after his lambs were sold, and have them returned in the autumn; or he might finish the experiment in the spring by fattening and selling his ewes in the market after the lambs were sold, and the fleeces taken off; or he might fatten his ewes to advantage by soiling. I have known this done with advantage.

Our native stock crossed by the South-down would probably give the best lambs. The South-down Sheep, of which a beautiful flock is to be seen at the Ten Hills stock farm in Charlestown, combine probably in a higher degree than any known among us the

best properties of thrift, mutton, and wool. The Leicester or Dishley are larger and fatter ; but they are much more tender in their constitution ; they require more keep and more care ; and neither in England nor in the New York markets, where I have particularly inquired of the butchers, are they considered so valuable.

BEEF.

The fattening of Beef is not greatly pursued in the county. In general the farmers fatten their oxen when they deem it no longer best to keep them for labor. Some farmers in Danvers fatten beef to some extent and profit. One farmer in the northern part of the county consumes all his produce in fattening cattle ; and he turns them off twice a year. To those, which he stall feeds in winter, he allows one bushel of potatoes and one peck of meal to a yoke with hay per day. He lays the greatest stress upon regularity of management. The condition of his whole place shows that he follows out with rigid exactness his own precepts. He has great skill in buying and selling, and therefore finds an advantage in this management.

I have almost innumerable reports of the excellence of apples for fattening beef as well as pork. Many farmers rate them as of equal value with potatoes. Most think them greatly improved by being steamed or boiled. I could hear of no exact experiments having been made to determine this matter, and I place little reliance upon vague inferences or impressions. It is well settled that the cooking of food for swine is expedient and profitable. The advantage of cooking food for fattening sheep is only as 14 to 13. The cooking of feed for fattening neat cattle in my own experience, and in the result of some full and careful experiments made not long since in Scotland, will not afford a benefit equivalent to the extra expense.

In passing through Manchester I was much struck with some very fine cattle in a pasture by the road side. On inquiry I found that with the exception of about two bushels of corn and twelve bushels of potatoes given them in the spring, their feed had been

nothing but hay. This yoke of cattle have since been killed, and weighed 2,400 lbs., and sold for \$160. These cattle, all circumstances considered, were so remarkable, and the success of the two brothers, who own the farm together, in fattening cattle has been so unusual, that I shall subjoin an extract from a letter from a highly respectable farmer and butcher, in answer to my inquiries in relation to this matter.

“ I requested my brother to look for the weight of the heifer that he purchased of Mr. B. Foster of Manchester. In this he has not been successful, except the weight of the tallow, which was 147 lbs. ; and that the heifer weighed, as near as he can recollect, 875 lbs., hide, beef, and tallow. This heifer was five years old. In April, 1835, I purchased of Mr. S. Foster a yoke of oxen, and of Mr. B. Foster a heifer, the weight of which was as follows :

<i>Heifer four years old.</i>					<i>Oxen.</i>	
Tallow	102	.	.	.	128	148
Hide	66	.	.	.	109	109
Beef	{ 321	.	.	.	{ 520	444
	{ 322	.	.	.	{ 520	454
811 lbs.					1,277	1,155 lbs.

In March, 1836, I purchased a yoke of oxen of each of the above gentlemen, which weighed as follows :

<i>Oxen of B. F.</i>					<i>Oxen of S. F.</i>	
Tallow	83	100	.	.	89	100
Hide	114	120	.	.	100	96
Beef	{ 528	508	.	.	{ 490	543
	{ 514	516	.	.	{ 491	534
1,239 1,244 lbs.					1,170	1,273 lbs.

The above cattle were all of what our farmers call the native breed ; and were fattened without the aid of grain or vegetables, with a very trifling exception ; they were fattened upon grass and

hay ; the two last pair in one year ; the other pair in two years ; and were only in common working condition when purchased by the Messrs. Foster ; besides, they have performed all the work on a small farm during the time they were in the hands of the abovenamed gentlemen ; and some work off the farm. These cases are not singular with these gentlemen. They are only samples of what they have been doing for twenty years. The only secret in the mode of their management is the superior quality of their hay, to which may be added careful and kind treatment."

The authority of the above is unquestionable. I can bear testimony to the very fine quality of their hay, owing to their extraordinary care in curing it.

SWINE.

Essex County may claim the honor of having produced the most important improvement in this species of live stock, which has ever been made in the country. A farmer in Byfield, a parish in Newbury, found accidentally in the market a pig of remarkable appearance, and this laid with him the foundation of the breed of hogs known as the Byfield breed, which have been extended through the county, and are known by this designation in England. They have been considered as too short, and not sufficiently heavy. They come to maturity early. They are quiet and docile in their dispositions and they are fattened at less expense than most others. They are easily made to weigh 300 lbs at fifteen and eighteen months old. Improvements have been made by crossing with this stock in all parts of the country ; and it is now impossible to find it pure. The weight of a small herd killed the present autumn, approaching as nearly to the original stock as any that can be found is subjoined.

Weight of 7 hogs—6 sold ; one salted for family.

397 lbs., 396, 366, 366, 412, 418, 520.

6 sold at 12 cts. per lb. ; 1 reserved at same—\$345.

These hogs were fifteen to eighteen months old, and show good stock and good keeping.

I found an excellent breed of swine in Gloucester, recently imported from Spain. Their black color would be with some persons an objection; but their shape and thrift and good humor, an essential to thrift, were admirable.

In an exact experiment, made by myself a few years since in this county, the largest gain ascertained was more than three pounds live weight; that is, 57 lbs. in 18 days. This was obtained on pure Indian hasty pudding. This was extraordinary, and not to be usually calculated upon. Two pounds live weight is a great gain. A farmer in Newbury stated to me, that he purchased a hog in October, weighing 60 lbs., and killed him in the ensuing March, weighing 600 lbs. This was an extraordinary gain; but the kind of feed was not stated. This farmer usually buys shoats at seven months old, and keeps them one year upon an average of three quarts of corn per day. A gain of a pound per day, dead weight, supposing corn to be one dollar per bushel and pork ten cents per pound, will fully pay the expense. The manure, where the styes are well littered, and the hogs are not compelled to make bricks without straw, will amply compensate for the attendance and care. A very excellent manager states, that a peck of meal, scalded or cooked for feeding swine, is equal in value to one and a half peck in a raw state.

The Gloucester Alms-House the last year fattened nine hogs, weight 2774 lbs.; wt. 306 $\frac{2}{3}$ lbs. each. The general failure of the corn crops for two past years is strongly indicated by the condition of the styes through the county. The average weight returned to me of swine, fattened at 18 months old, is from 300 to 350 lbs. A farmer in Manchester states, that, in his experience, barley meal for fattening swine is of equal value, pound for pound, as Indian meal. This I have before remarked; and it is fully confirmed by the experience of the intelligent Superintendent of the Farm School, near Boston, who has communicated with me on the subject.

NEAT CATTLE.

Essex County is not a grazing territory. Few cattle are raised in it. The stock generally to be found in it is what is called our

“Native Stock,” which is a mixture, of no certain origin ; but in which the Devon race greatly preponderates.

Some cows, which have been owned in Essex, have probably never been exceeded, for their dairy produce, by any in any part of the country. The Oakes cow, owned in Danvers, made in 1813, 180 lbs. of butter ; in 1814, 300 lbs. ; in 1815, over 400 lbs. ; in 1816, 484 $\frac{1}{4}$ lbs. At the same time the family reserved one quart of milk per day for their own use ; and she suckled four calves four weeks each in the course of those years. She made in one week 19 $\frac{1}{4}$ lbs. butter ; and she averaged over 16 lbs. of butter per week for three months in succession.

The Nourse cow, owned in North Salem, made 20 lbs. of butter in one week ; and averaged 14 lbs. butter per week for four successive months.

The Haverhill heifer, two to three years old, produced 14 lbs. of butter in a week after her calf was killed at six weeks old ; and more than 18 lbs. of butter in the ten days after her calf was killed. These cows were all of native stock.

The largest amount of milk given in one day by the Oakes cow, is 44 $\frac{1}{2}$ lbs. In the case of the two first cows, they were fed in the most liberal manner with meal and their own skim milk. In the case of the heifer, the feed was grass and pumpkins.

I subjoin a list of a few other cows in the county, whose yield is well authenticated.

1. Cow owned by John Barr, in Salem.

In 274 days the weight of milk was	7611 lbs.
1822. No. of quarts, beer measure,	2965 $\frac{1}{2}$.
1823. In 268 days, weight of milk was	7517 lbs.
No. of quarts, beer measure,	2923.

The sales from this cow, including the calf at 5 dollars and milk at 5 cents per quart, in 1822, was \$153.25. In 1823, \$151.15.

2. Cow. John Stone, Marblehead. From June to October this cow averaged 11 lbs. of butter per week.

3. Cow. N. Pierce, Salem. 3,528 quarts milk per year,—nearly 10 quarts per day.

4. Jeremiah Stickney, Rowley. 19 quarts daily ; calf at six weeks old weighed 196 lbs.—gain 2 $\frac{3}{7}$ lbs. per day.

5. Cow. Isaac Osgood, Andover. 17 quarts of milk per day; made 50 lbs. of butter in the month of June.

6. Cow. S. Noah, Danvers. In 148 days from 2d May, gave $587\frac{1}{8}$ gallons milk;—more than four gallons per day for that time.

7. Cow. T. Flanders, Haverhill. From 20th April to 22d September besides $46\frac{1}{2}$ gallons milk used for family, made 163 lbs. 4 oz. butter.

8. Cow. Daniel Putnam, Danvers. "This cow calved May 21st. The calf was sold June 20th for \$7 62½. During the 30 days that the calf sucked there were made from her milk 17 lbs. of butter. From June 20th to September 26th (14 weeks) she gave 3370 lbs. of milk, or more than 34 lbs. 6 oz. per day. The greatest quantity on any one day was 45 lbs., or $17\frac{1}{2}$ quarts. The weight of a quart of her milk is 2 lbs. 9 oz. The greatest quantity in one week was 288 lbs. The quantity of butter made in the same 14 weeks was 139 lbs. The greatest amount in one week was 12 lbs. 2 oz."

9. Cow. Owned by William Osborn, Salem. The milk of this cow from January 24th to April 10th, was 3127 lbs., varying from 33 to 48 lbs. per day, averaging $40\frac{1}{4}$ lbs. per day during that time.

10. Cow. Owned by Richard Eliot, Danvers. This cow's milk gave 16 lbs. of butter in one week; and she yielded on an average from 15 to 18 quarts per day, beer measure, for a length of time.

All these cows were what is denominated our native stock. An intelligent gentleman, the owner of an extraordinary cow in the interior, remarks, in a letter detailing her yield, what is highly important to be remembered. "From the experience I have had with this cow, I feel quite sure that many cows, which have been considered quite ordinary, might, by kind and gentle treatment, good and *regular* feeding, and proper care in milking, have ranked among the first rate."

The yield of a cow now owned in Andover is remarkable. Her origin is not known, but her appearance indicated a mixed blood; and I was led to believe she partook of the Yorkshire blood, a race of cattle which I have found in the neighborhood of Moultenboro' and Canterbury, N. H., but whose introduction I am not able to trace.

In 1836, besides supplying the family with cream and milk, there were sold 127 $\frac{3}{4}$ gallons milk at 14 cents per gallon, \$17 88

166 lbs. butter at 25 cents, 41 50

Calf sold, 8 00

\$67 38

“ The keeping was good pasture and swill of the house, including the skim milk, with three pints of meal per day.” These statements show, in a strong light, the difference between a good and a poor cow ; and the utility of liberal keeping.

The difference in the butter properties of different cows is not generally considered. In a yard of five cows, upon repeated trials, made at similar times, and as near as could be under the same circumstances, by a farmer in this county, the difference in the yield of cream upon 9 inches of milk was found to be as 13 to 3.

Attempts have been made to introduce some improved foreign stocks into the county ; the Alderney, the Holderness, and the Improved Durham Short-Horn. These experiments are reported to have been satisfactory to those, who have made them ; but I have been unable to procure any exact returns. Admiral Sir Isaac Coffin presented a valuable Improved Durham Short-Horn bull and cow to the Massachusetts Agricultural Society, which were placed on the farm of a gentleman in Salem, who retains some of the half-blood stock. The amount of the yield in milk of this short-horned cow is mislaid ; but the owner states from recollection “ that her milk night and morning, weighed 48 lbs., when she had nothing more than pasture feed in June.” Respecting this stock, the gentleman adds,—“ In my opinion they combine the two qualities of milk and beef in a greater degree than any other stock I am acquainted with. With me the pure bloods and a large proportion of the mixed blood have proved great milkers, and, when not in milk, take on flesh very rapidly. I have slaughtered two half-blood heifers, which have weighed at four years old over 700 lbs. A pair of half-blood steers, at four years old, became so very fat from common keep, that I was induced to dispose of them to the butchers ; they weighed 1100 lbs. each. The greatest objection to them in my opinion is, that they incline to go dry a longer time than our native stock.”

My own experience differs somewhat from the respectable authority just given. I have had some of the full-blood and some of the mixed breed ; and I am not able to say anything in favor of their milking properties. I have seen some remarkably fine specimens of early maturity and thrift among them ; and more beautiful models of cattle than some specimens, which I have seen of them, I believe are no where to be met with.

Another public-spirited gentleman in Bradford imported some of this fine stock for his farm. His expectations do not appear to have been fully answered, though I was not able to obtain any exact information of their yield in milk or butter. From the letter of his correspondent, whom he employed to procure these fine animals for him without limit as to expense, I extract as follows. "I must observe that this breed of stock has not been held of late years in great estimation for milking." He adds that "Short-Horns are only calculated for the best and most powerful land ; on poor soils they will do nothing. The most improved plan of keeping them in winter is to have them loose in open warm hovels, two or four together. The bulls you will find it necessary to keep in altogether from one year old. The Milch Cows are kept at the stake in enclosed houses ; and turned out a short time in the day time—they bear the cold badly."

There is another very strong testimony, that of Mr. Shiriff, who travelled in this country for agricultural information in 1834 '5 ; and who is pronounced by one of the most eminent breeders of the Durham Short-Horns in England, a farmer of the first rank. In his journal he remarks,—"There was a fine short-horn bull, intended to improve the dairy stock, which I did not see. I took the liberty of advising the cross to be tried on a small scale, believing the Short Horns the worst milking breed in Britain."

I give these opposite authorities, in justice to the agricultural community. The subject deserves much farther inquiry, and the test of actual experiment. On this account it were greatly to be desired that the gentlemen, who own this fine stock, and from the most public-spirited designs have introduced them into the country, would give the public exact statements of their product. Some oxen in the county descended from the Short-Horned Bull Admiral in the second

generation are very fine cattle, in point of size, docility, condition, and work. I have seen the importations of this stock made by the Ohio Company ; and it seems impossible to imagine animals of more perfect symmetry and beauty ; or of better promise in point of thrift and condition. They may however suit far better the luxuriant meadows of Ohio and Kentucky than our bleak and short pastures.

MANURES.

Much and increasing attention is paid throughout the county to the saving of manures and the formation of compost. Vastly more remains to be done. In many parts of the county, cellars are considered a necessary appendage to the barn, where the manure is sheltered from the sun ; and, by some of the most careful, from the external air likewise. A Danvers farmer, on whose good judgment I place great confidence, expresses his strong conviction, that the value of his manure is doubled in a closed cellar, in comparison with it under the former mode of exposure to the sun, and air, and rain. In most of these cases the barn is placed on a side hill ; the cellar is high enough to load in and turn the team and cart ; and a trap door is in the barn floor, so that bog-mud, litter, or other refuse may be easily thrown in to be formed into compost by the store hogs, who are put there to work, and who faithfully earn their living. In two places I found provision made for saving all the liquid manure from the stalls and the barn yards. It was conveyed by gutters into a capacious cistern, from which it was occasionally pumped into a watering cask, like that used in the streets of cities, and distributed on the grass ground. This was done with great advantage. The liquid manure of a large herd of cattle, could it be properly husbanded, would be of equal value as the solid manure. The subject of saving manures, and collecting and compounding them, is a matter which cannot be too strongly pressed upon the attention of farmers. It is the very life-blood of successful agriculture.

The subject of the application of manures, whether in a perfectly green and unfermented, or in a decomposed state, has been matter of much inquiry among the Essex farmers. The general impression

is, that they should be used in a green state, as their most valuable parts are lost in the progress of decomposition. The philosophy of manures is as little understood as the philosophy of digestion. Nature draws a veil over many of her processes, which no prying curiosity has been able to raise, and no solicitude has induced her to uncover these operations. By what means the food received into the stomach goes, in its wonderful subdivisions and changes, to the formation of blood and bone, muscles and skin, hair and nails, is a matter about which we know as much as we know how the food of plants is taken up and elaborated, and goes, according to the seed which is sown, to the formation of the stem and leaves, the coloring and taste, the flowers and fruit. It may operate as a stimulant, waking the dormant powers of the earth into action. It may serve as the substance, out of which the plants are to be formed ; and to a degree the evidence of this is perfect. It may so affect the earth and the atmosphere, that these great reservoirs of the elements of vegetable and animal life may at once furnish their proper and required contributions. But conjecture here is in a great measure idle. We may talk very learnedly on the subject without knowing any thing about it, or being able to communicate any valuable information. On this matter, experience and intelligent observation must be our guides. In actual bulk manure, which is thoroughly decomposed, loses one half. Its activity, its power of producing heat, one of the ascertained principles of vegetable life, is likewise lost. On these accounts, it is obviously best to apply it green. The experience of intelligent farmers almost universally confirms this. But unfermented manure, if applied immediately to the roots of plants, may, by too much action, or too much heat, or by supplying their food in too lavish or too concentrated a form, destroy them. There is no danger from this when manures are spread and ploughed under the soil, or scattered over its surface. But where their immediate action is desired in the soil, it is important, before they are taken out of the yard, that they should be in a partially decomposed state, or rather in an active state ; and for that reason they should be turned over and thrown into heaps in the cattle yards in the spring, that they may become in a degree warm before they are applied. If they are to be applied directly to the roots of crops, they should be either mixed with earth, or so far advanced

in their decomposition, that no evil may result from the heat of their first action ; and that they may be so subdivided and dissolved as to be in a condition to be at once taken up by the absorbent vessels of the plants.

These views will explain what I wish to say in regard to our great crop, Indian corn ; and what long experience and observation have confirmed. The question is often asked, shall the manure be spread or placed in the hill ? I answer, do both. Its immediate action is needed to bring the plant forward as soon as possible ; and therefore partially decomposed manure should be placed in the hill. It is equally necessary that the plant should not suffer from want when its roots spread themselves beyond the hill in pursuit of food. The unfermented manure, spread and ploughed in lightly, will be in a condition for the use of the fibrous roots when they advance to receive it. Another question often proposed is, should the manure which is spread be ploughed in deeply, or covered lightly, or simply laid on the surface ? If the plant to be cultivated be a tap rooted plant, it will find the manure though it should be buried deeply. If it has a spreading and fibrous root, like all the cereal grains, the nearer it is to the surface, without being entirely exposed on the top of it, the more available it is to the growth of the plant. If laid upon the surface and not covered, much of it must inevitably be lost by the sun and rain and wind. In respect to Indian corn, especially recollecting the cold seasons of the two last years, it is important by every possible means to get the plant forward as fast as possible ; and for that reason to select the warmest and the driest land ; to manure with fine manure in the hill, and with unfermented manure spread broad cast ; and to plant as soon as the land can be made dry and warm enough to receive the seed. There is no crop that will better reward the most liberal cultivation.

In respect to the manuring of wheat, fermented and finely dissolved manures may be safely applied the year of its being sown ; but not so with unfermented manures. In general, it is best that the crop, which precedes the wheat rather than the wheat itself, should be manured.

In regard to the application of manure to potatoes, the almost universal opinion has been, that when manured in the hill, the seed should be laid upon the manure. Many farmers have reversed this

practice ; and now place the manure upon the seed, they say, with superior advantage.

Besides barn manures, slaughter-house manure has been used with great effect ; but it is necessary it should be mixed with loam. Night soil, mixed in the proportion of one part of night soil to four of loam or fine gravel, has been used with extraordinary efficacy, upon peat or bog meadow. Muscle bed is much used, especially by the Danvers farmers, for their onions and vegetables for the market. It costs in Salem about one dollar for a large horse load, and is applied liberally. At Manchester, where it is quite accessible, it is used with great advantage either as a top-dressing or ploughed in. At Beverly, I have seen its excellent and lasting effects as a top-dressing on grass land. A farmer in Danvers states, that a gondola, containing eight four-ox loads of muscle bed, will deliver its cargo near to New Mills, for seven dollars. This is a low price. He is accustomed to spread six or seven loads to the acre, in winter, when frost will render it pliable. It will do well to apply it once in four or five years ; oftener than this, it binds the land and renders it hard.

He says, it is of excellent use when applied to land which is to be laid down to grass with barley or oats. Its effects are lasting ; and no other application will be required for years.

In the town of Essex, a great amount of clams are dug for fish-bait. The shells are much used for manure. The keeper of the almshouse in Essex, whose management is highly creditable, says, “ as to the value of clam-shells for manure, I think the broken and the whole shells very useful to low land, either to be spread on or ploughed in. They render the ground light and warm, and are very durable. They likewise enrich the land very much.” The same may be said of oyster shells, which are obtained in some quantities in the cities.

The great amount of squashes mentioned in a former part of my report, as obtained from two acres of land, is in some measure to be ascribed to the use of fish oil or blubber oil. The farmer, living near the fishing village in Lynn, obtains in the winter time a great quantity of fish livers and garbage. From this he procures the oil. After his casks are emptied of their oil, he fills them with water, which remains sometime ; and this water, thus considerably charged with oil, he applies to his squash vines. The effects are powerful. .

One farmer, whose farm lies on the sea, has this year made some trials of fish as a manure. The Munhaden, Alewives, or Hard-heads, as they are called, come to the shores in the early part of the season in great numbers, and are easily taken in seines. In the southern parts of this State, and in Rhode Island, they are used in great quantities ; either spread upon the grass land, or laid near to, or placed in, the hill of corn. They are very powerful ; but their effects not lasting. The animal matter contained in them is considerable ; and the bones are composed of phosphate of lime, which is a strong and active manure. The great objection to their use is, that to a person not interested, they render the air extremely offensive. Not so to those who find a profit in their application. To most men, a golden breeze is always fragrant. There are other marine manures of great value. I have found sea sand, put in the hill of potatoes, in low land of great efficacy. My experience in this matter is not singular. The siliceous matter divides the soil ; and the salt which adheres to it serves to stimulate the plant. Sea sand has been used with advantage at Sandy Bay. The marine plants are used with very beneficial results. The eel-grass is of little value excepting as litter. Nothing seems more grateful or healthful to swine than an abundance of this grass in their styes. It serves to increase the compost heap ; but it becomes light and does not leave much when dried. Rock weed and kelp are valuable when ploughed in ; but they are used to most advantage when applied directly as a top-dressing upon grass land. Then their effects are remarkable, and no more efficacious manure can be used. If left in heaps for any length of time, they soon become heated and decomposed ; and are gone.

The refuse of the comb manufactories, horn tips and horn shavings, are greatly valued as manures. The refuse of the glue manufactories are used with great advantage. Ashes, leached or crude, have been applied by different individuals with various success. A farmer of high authority, in Newbury, states :—" I think leached ashes very valuable to spread on grass land ; likewise for onions and grain. I use 20 or 30 cart loads. I gave this year three dollars per load of fifty bushels." A respectable farmer states, that he deems them of no use unless applied in conjunction with other ma-

nure, and then of great efficacy. In their application upon a rich loam to corn, both in the hill and spread round the hill at the first hoeing, I have seen no beneficial results from them. The experience of J. Buel, Esq., of Albany, he told me, in the use of ashes, coincides with mine. Leached ashes, or soap-boilers' waste, which contains always a quantity of lime, I have used with advantage for wheat. These different results may depend upon soil, season, modes of application, or various circumstances, which we have not yet been able to determine. There can be no doubt of their efficacy and utility in some cases. There are many good authorities to this effect.

The ashes of anthracite coal have been spread upon grass land in Gloucester with obvious advantage. Peat ashes have been used in Newbury on grass ground with much advantage; but in excess, or when frequently repeated, their effects are stated to be injurious.

The use of gypsum in the interior of the county, has been successful; but not so on the sea-board. In Haverhill, Andover, and Methuen, its effects are marked; and, in some cases, are as distinctly observable in parts of a field on which it has been used, where the other parts have been omitted in the distribution, as the enclosure is by the fences. The testimony of an experienced and careful farmer in the interior is subjoined. "As to gypsum, I have used it with good success. It is the opinion of many of our farmers, that it injures the land. But from actual observation, I have been led to believe otherwise. There are pastures in our vicinity, in which plaster has been used 20 years without ploughing; and they are now the best pastures in the vicinity. I think, that in some instances, our crops have been doubled by the use of it. We usually apply about $2\frac{1}{2}$ bushels to the acre." This is a large application; and it is questionable, whether the benefits are large in proportion to the quantity applied. In Berkshire County, a bushel to an acre is deemed ample.

Of the ploughing in of green crops for enriching land, I know of but one decisive experiment; and this made by one of the most intelligent and best friends of the farming interest in the county. This was made in 1832-3; and honored by the premium of the Essex Agricultural Society. This was a crop of buckwheat ploughed in when in full flower. "The Committee say, on examining the land

on which the experiment had been made, they found the growing crop of corn thereon was in a much more promising and flourishing state, and much better sustained the severity of the drought, to which all lands in that vicinity were then exposed, than the crops of corn which were then growing on the contiguous ground of a similar soil; and which had been cultivated and manured in the ordinary manner." Besides the ploughing in of the green crop, the field was manured in the same manner as the other lands with which it is here compared.

The price of manure in Essex County, is extraordinary. Three dollars and a half a cord for stable manure have been paid at the stables in Methuen; \$4.50 in Andover; and I have known \$6 paid in Salem for compost of night soil and muscle bed. A farmer in Middlesex, told me he was content to pay \$5.50, for unmixed cow manure in Lowell, and cart it a distance of 4 miles. The expenses and trouble of transportation are often fully equal to half the cost of manure. It is surprising to find farmers willing to pay such prices; and it would be well to inquire whether it would not be expedient to keep one man whose sole business it should be, whenever the team could be spared, to collect the materials for a compost heap, which are to be found in abundance in almost every vicinity for the labor of going after them. At the prices above named, manure may well be called the gold dust of the farmer.

I am unwilling to quit this homely subject without remarking, what always strikes me with great force, that beautiful and sublime miracle of the divine Providence, by which the very refuse, which man casts out and loathes, returns to bless him in the verdant fields, and the teeming harvests, in the most fragrant flowers, the most delicious fruits, and the most substantial products.

The use of clover sowed among grain and even among corn for ploughing in as the means of renovating the soil, has not prevailed within my knowledge in Essex County; but is commended to their attention as likely to be eminently beneficial. For this purpose we recommend most strongly the June, southern, or early clover so called.

No considerable experiments in the use of lime have come under my notice. A farmer in Haverhill, who has applied lime as a top

dressing upon his grass lands, is disappointed in his expectations of advantage from it. Extensive beds of clay marl have been discovered ; and this has been applied with great advantage on peat lands or bog meadows.

FRUIT TREES.

Fruit is an article cultivated in some parts of the county to much profit. A farmer in the northern part of the county, two years since, sold peaches from his orchards to the amount of \$250, and the year previous, to the same amount. The severity of the seasons has been fatal to this fruit in most parts of New England ; but the cultivation is so easy, and the yield so early, and, when successful, so valuable, that it deserves attention. The farmer's gains where the farm is small, must be made up of small items. The apple trees of this same careful and skilful farmer, were arranged on the borders of all his fields ; and placed parallel with the walls at such a distance, that he could plough between the wall and his trees. He, therefore, kept a belt of about twelve feet, in which the trees stood, always cultivated. This was to the benefit of the trees ; and, at the same time, enabled him to keep the space between the trees and the wall clean and entirely free from weeds and bushes.

The cold winter of 1833-4, was fatal to the Baldwin apple trees, throughout the county ; but there are other and a great variety of apples cultivated to advantage. The canker worm, which for some few years infested and destroyed many fine orchards, has disappeared. The application of tar to the trees, at the time of their ascent from the ground, was found to injure the trees. This injury has been successfully obviated, as I learnt in the practice of an excellent cultivator, by first putting a belt of adhesive clay round his trees, and applying the tar upon the clay, which, when the season of the ascent of the millers had passed away, might easily be removed without injury to the tree.

One farmer, in ordinary years, sells 300 barrels of apples. They are picked carefully ; packed in dry barrels ; immediately put into a dry and cool cellar ; and are not usually disposed of until May or

June. His fruit is of select varieties, the product of great care ; and the remuneration is ample. Eight hundred dollars a year is not an unusual product of his orchard.

The use of cider, though that of the choicest quality is still made in the county, is going fast out of fashion ; and it has ceased to be of much demand in the market. The value of apples for fattening swine and beef stock, where they are not given in too great excess, is so fully established by the experience of many of the best farmers in the county, that apples ought to be much cultivated for that, if for no other object. As human food likewise, when simply cooked, few articles are more wholesome or nutritious.

Other fruits, pears, plums, grapes, and the smaller fruits are not cultivated as they ought to be, though much more extensively than formerly. A taste for flowers and the external rural embellishments of the houses and grounds, is every where springing up. Besides its strong tendency to multiply the attachments to home, among the best safeguards of virtue, and furnishing sources of delightful recreation, it is highly conducive to intellectual and moral improvement.

The Rev. G. B. Perry of Bradford, a gentleman as much distinguished for his practical skill, intelligence, and public spirit, as for his exemplariness in his pastoral character, has ascertained an effectual remedy against the insect, which has been so fatal to the plum trees by boring into them, and causing an exudation of sap and a black excrescence, which presently destroys the trees. As soon as there is any appearance of the disorder "he cuts off every limb affected with it ; and where the disorder is in the trunk, carefully chisels it out, always taking care to put every limb and chip taken from it immediately into the fire. By this means, he has got entirely rid of the disorder. He has found the worm, which occasions the injury, most strong and active about the 4th of July."

A Society of Natural History, has been established in the county, who have occasional exhibitions of flowers and fruits. Some of the gardens and green houses in Salem and its vicinity, exhibit great skill, intelligence, and success, in the beautiful arts of fruit and flower cultivation, and are exerting a powerful and delightful influence.

FOREST TREES.

This subject having been committed by the government to another department, has been no farther matter of inquiry with me, than as connected with a supply of fuel, a matter essentially affecting the value of land and the interests of the farmers. Facts, which have been stated to me on respectable authority, I have carefully noted.

1. A gentleman in Andover states, that in making the Rail-road, it became necessary to cut away some wood. Two pieces were cleared, containing 4 square rods each ; and on measuring the wood, the product would be equal to 60 cords to the acre. This was of pitch pine, yellow pine, or Norway pine ; and was the growth of 25 years. It was worth \$5 per cord, delivered.

2. Another piece of land was mentioned by the same person as having been cut, being the growth of twenty-five years, and yielding 60 cords to the acre. This likewise was of pitch pine.

3. Another lot of land containing $1\frac{1}{2}$ acre, produced 36 cords. This was of mixed growth, oak and pine ; and two-thirds of this product was considered the growth of twenty years.

4. A farmer in Saugus states, that in oak wood, which is 13 or 14 inches in diameter, may usually be counted forty rings, indicating the years of its age.

5. It is the opinion of an experienced farmer in Manchester, that he can cut his wood-lot to advantage once in twenty years.

6. I was shown a wood lot in Wenham, from which the growth of oak timber was entirely cut off in 1816. It is now in pine and judged to yield 25 cords to the acre. The wood was not closely set. The growth is white pine, and many of the trees are more than one foot in diameter. The growth of white pine will, in his judgment, pay the interest of more than one hundred dollars per acre ; in this case, of more than two hundred dollars per acre. The value of pine is here from five to six dollars per cord.

7. A farmer in Lynnfield showed me a wood lot formerly pine, now oak and mixed, fully averaging 30 cords to the acre, of twenty-nine years growth. Fifty acres of wood now growing, he believes

from an exact calculation, as far as exactness is applicable to the subject, increases 100 cords per year.

8. A farmer in Ipswich deems the white birch, on the land on which it is likely to grow, more profitable than any other wood that can be grown ; and says that it may be cut to advantage once in seven or eight years. Some other farmers fully concur in this opinion.

9. Another farmer, whom I requested to favor me with his opinions and experience, thus writes. "In November and December of 1824 the birches on the acre on which they grew were all cut off. It was an old growth, say from 25 to 30 years of age, and the first of the kind on the lot. The birches were large and stood not very near together ; they were from 5 to 9 inches through at the butt end. I had 23 cords by measure from the acre. There are now from five to eight sprouts on the same stumps, and, I presume, as many as that number have died and fallen down within the last four and five years. I am satisfied there now is as much birch wood on the acre, as when I took off the old growth thirteen years since ; but generally not fit to cut by four or five years. Rocky moist land is believed the most favorable to the growth of birch wood ; and where the soil is favorable I consider the gain more valuable than any other kind of wood ; and white pine the next in value, in my vicinity. When good white or yellow oak wood sells near home at \$5 per cord, I think from much experience, birch wood is as cheap at \$4, or in that proportion. Birch wood being much straighter, packs much better, and we get more and better cords. The growth of an acre of maples adjoining the acre of birch has not been of one half the value of the birches. "I think," he adds, "that button wood, (the Plane tree,) and the white ash may be cultivated to as great a profit on my land, as any kind of forest trees whatever." The cultivation of forest trees has not been pursued to any extent. Some small experiments have been made with the locust, the oak, and the birch ;—this subject demands, on various accounts, much more attention than it has received. Essex County has heretofore supplied a great amount of ship timber, and considerable is still growing ; but the demands of an increasing population will be constantly needing more for timber, fuel, and fencing. The growth of the locust and larch, or Scotch fir, do not injure, but the former certainly improves, the pasturing.

The locust has been cultivated in some parts of the country to a great profit ; and though often destroyed by the borer, this ought not, where the object is so important, wholly to discourage the cultivator. The cultivation of immense plantations of the German larch in Scotland, is now resulting in most extraordinary profits.* The lining our roads, and many of our grounds with trees, both useful and ornamental, would confer immense public, as well as individual benefit ; and is alike dictated by taste, interest, and public spirit.

FENCES.

The fences in general throughout the county are of stone, of which material there is everywhere an abundance. The condition of the fences generally through the county is wretched and disgraceful. The law requires that all partition fences shall be four feet in height ; but the law appears to be seldom enforced, and the fences being neither in straight lines, nor of the legal height, are of the most slovenly description. It is impossible to conceive of any more irregular divisions than the enclosures throughout this county generally present. Straight lines are so important in point of convenience, as well as desirable in appearance, that a hint to the Essex farmers in regard to removing unnecessary fences, and bringing their enclosures into more regular shapes, may not be lost upon them.

The great evil of stone walls, especially bank walls, is the danger of being thrown down by frosts. A farmer, whose exactness of observation entitles his judgment to respect, suggests, that the mistake lies in water being permitted to settle at the foundation of the wall, which is commonly laid in a trench ; therefore, whenever a wall is built, gutters should be formed on each side of the wall, at a short distance from it, by which all the surface water, which would otherwise settle under it, should be immediately conveyed away. This seems a highly useful suggestion, and I have known it practised upon with advantage.

Of live fences, there are no samples of any considerable extent in

* Appendix F.

the county. A farmer in Salem has cultivated the buck-thorn in his garden to a degree sufficient to demonstrate its usefulness, the ease with which it can be raised, and its extraordinary beauty. This hedge is now more than four feet in height ; proof against cattle ; not infested by any worm or insect ; and extremely ornamental.

The white mulberry has been recommended in the county for hedges ; but I found no instances of its cultivation for this object. Its utility in this respect remains to be tested. The cultivation of the red cedar for fence might in some places be advantageously introduced. I saw at Mount Vernon some years since a hedge of this kind, which Judge Washington informed me was of seven years' growth. It was neat in its appearance, and perfectly efficient as a protection against cattle. It was raised from the seed. The difficulty, which might otherwise be experienced in causing the seed to vegetate, is obviated by soaking the seed in warm water, and bruising the glutinous envelope with a stone.

FARM BUILDINGS.

The buildings in Essex County are generally of wood, and this is a country abounding in materials for more durable constructions. That the common stones of the country may be used in the construction of dwelling-houses and other buildings, with as much advantage and at as little expense as any other material, is demonstrable. A handsome stone house, two stories in height, forty feet in length, and thirty-four in width, with cellars under the whole, and with two sheds projected, has been erected within the last year at Topsfield for \$2500. It is believed that this is less than it could have been constructed of bricks by the whole cost of the bricks. I subjoin the minutes of the expense in a letter from the owner.*

Great attention is now paid through the whole county to forming cellars under the barns, for the purpose of saving and compounding manure. These arrangements cannot be too much urged. One of the most complete establishments, in the way of a barn and stables, is to be found at Indian Hill in Newbury. The arrangements here for the cattle are excellent. The horses and cattle stand upon stone

* Appendix, G.

or clay ; and the stale is designed to be conveyed by tight gutters into a reservoir. The barn likewise encloses a large threshing mill, built upon the best Scotch model, which threshes and cleans the grain for the neighboring farmers for the straw. The establishment will be deemed too expensive for farmers in general.

There is another barn in West Newbury, belonging to Moses Newell, of an admirable construction. It is 85 feet in length, 40 feet in width, and 20 feet in the posts. The entrance is at the end by an embankment, the floor being about eight feet above the sills. The mows or bays on one side go down to the ground, which greatly alleviates the trouble of unloading hay. The lower story on the other side is occupied by the cattle-stalls. There is likewise a capacious vegetable cellar secured against the frost. The barn combines in a high degree comfort, convenience and cheapness.

There is another barn, excellent in its arrangements, on the farm of Joseph Howe, of Methuen. This barn is 84 feet in length, 40 feet in width, 17 feet posts. It stands upon a side hill. The cattle-stalls and the hay and granary are in the second story, which is entered by an embankment. The cattle yard is on the eastern and upper side of the barn, so that all the washings of the barn yard are received into the lower story or cellar. The lower story embraces a manure cellar the whole length of the building directly under the stalls of the cattle, and which serves likewise as a pig sty ; a large place well enclosed for the deposit of fruit and vegetables ; a stable for the horses ; a boiling room, with an aqueduct ; a work shop and tool room ; and a carriage-house. Of these buildings I have taken measures to obtain cheap models or plans.

But the most complete erection of this kind, and one probably not exceeded by any one in New England, is a stone barn in Danvers, on the farm of Stephen Phillips. This is 100 feet in length and 44 feet in width, with a paved cellar under the whole, of ample height. He carefully deposits in this cellar a large amount of mud from his ditches and meadows, and this is intermixed with the manure of his cattle from above. His barn yard is paved, and the washings of this likewise all flow into the cellar. His store hogs are likewise kept in the cellar. The deposits of all his stables go into the same reservoir. Besides this, his cattle are tied in the barn every night, sum-

mer and winter, an arrangement practised by several judicious farmers, and which ought to be adopted by every farmer. Thus nothing is lost, and a great amount of manure is accumulated. The erection is an expensive one, and beyond the means of most New England farmers; but its conveniences may be advantageously copied at a reasonable cost. The barn floor, 14 feet in width, runs the whole length of the building; the haymows are on one side, and the stalls and stables on the opposite side, with scaffoldings over them. The roof is of a very steep pitch, and two successive scaffoldings are over the barn floor, for the reception of straw and coarse fodder. Thus no room is lost. Frames likewise are so placed, that a large amount of corn stalks may be cured in a green state; and in this condition are inferior to no kind of dried fodder, which can be given to cattle. A large shed, the whole length of the barn, is projected on one side for the reception and protection of wagons and farming implements.

FARMING IMPLEMENTS.

The Essex plough, built in Danvers, where the mould boards are cast in two different sizes, is not surpassed by any one within my observation for ease of draught, and manner of executing the work, especially in greensward. Whether the right shape of a mould-board in this case, be matter of accident or calculation, it has been exactly reached. The objections to many cast-iron ploughs, are the shortness of the mould-board, by which the sod is often broken off before it is completely turned over, and falls back into the furrow; or the concave rather than wedge-like form of the mould-board, by which the resistance is greatly increased, the furrow slice is rather shoved forward than raised up; or a form of mould-board, by which it is curled over rather than laid flat. These objections do not at all apply to the Essex plough.

In some parts of the county, the side hill plough with a changeable mould-board is used for all ploughing. It saves considerable time in turning at the corner of a field, and it avoids a dead furrow in the center.

WEEDS.

The principal weeds which infest the fields, and are considered pernicious to agriculture, are the ox-eyed daisy or white weed ; the wood-wax or *genista tinctoria* ; the Canada thistle ; and the charlock. The Canada thistle does not much prevail ; and where it is kept constantly mowed, without being permitted to sow its seeds, will, after two or three years, disappear.

The ox-eyed daisy prevails in some parts to a great extent. High cultivation and much enriching the land, at the time it is laid down to grass, will destroy it, or rather the grass will conquer it ; but, in this case, great care must be taken not to use manure which has been exposed, to be mixed with the seeds. Marine manures, are, in this respect, free from objection. Many farms in the county surrounded with fields infested by it, are perfectly free from it. They are kept clean, by extreme vigilance, and personal attention, in destroying at once, all the plants that appear.

The wood-wax, (*genista tinctoria*,) prevails principally in Danvers, and in the parts of Salem, adjoining Danvers. It spreads rapidly where not checked, and destroys all the grass, where it prevails. Ploughing will destroy it ; but in most of the pasture lands, where it prevails, all cultivation is impracticable. One persevering farmer has destroyed it by actually digging up the roots with a hoe and pick-axe, wherever the plants appear. Another has destroyed it by covering it completely with meadow hay or litter, thus smothering it and stopping its growth for a whole season, when it would disappear. The hay was afterwards raked off, and used for littering the stalls and yards. It is usually burnt on the ground in the winter, when the condition of the ground admits of access to it. This checks, but does not destroy it ; and is thought to injure the land, besides losing the litter which would otherwise go to increase the manure heap. It grows luxuriantly, and a farmer in Danvers has lately discovered a valuable use for it in soiling sheep. It is cut green, and carried into their yards ; and some of it is cut and cured for winter. The sheep are said to be fond of it ; and to be kept fat by it. This is reported to me on credible authority. I regret that I did not hear of it in season to see the sheep, and the way in which the fodder is cured.

Charlock or Cadluc. This pernicious and troublesome weed, known by some, as the wild turnip or mustard, prevails to some extent. I regret that I know no effectual way of destroying it, but by rooting it out by hand. One farmer stated that he had destroyed it by fallowing his land, and ploughing it as often as the charlock appeared. I have shown in the Appendix,* to the surprise, I believe, of many farmers, how, in the cultivation of rye in Haverhill, it has been turned to a valuable account. This excellent manager in his pleasant way, inquired of me where he could get some charlock seed to stock his fields. This experiment is emphatical in favor of green dressings for land.†

BEEES.

BEEES are kept to some extent in Essex County.

1. A farmer in Andover, who has kept bees for forty years, speaks of them as a profitable stock. In September, one of his hives since June had yielded one swarm of bees; and 22½ lbs. of honey, sold at 20 cents per lb.; and he supposed enough was left or would be made by them for their winter's consumption. Another farmer had obtained this season 54 lbs. of honey from one hive, without destroying the bees.

2. A farmer in Danvers, raises bees for sale. His hives usually bring him \$7 to \$8. He has this year obtained ten swarms from four hives. Another farmer in Andover obtained twelve from four hives.

3. A farmer in Bradford, considers that a hive of bees yields an annual profit of \$10 in bees and honey. He had taken in August, three boxes from one hive, containing eight lbs. each, and expected to take another of equal size; this would give thirty two lbs. in the whole.

Buckwheat is sown for their use, but the honey from it is inferior. Clover cannot be reached by them. Mignonette, and the poppy, or China rose, is much liked by them.

* Appendix E.

† Appendix H.

4. I subjoin in the Appendix a letter* from an intelligent and careful observer, who has given much attention to Bees. His apiary is beautiful. The bee moth is to be guarded against by making the crevices of the hive tight with putty or glue ; and then it is said the bees will defend the common entrance. Others recommend, that the hive should be daily lifted up and the bottom swept, that the millers and their deposits may be brushed away. A gentleman at Northampton, whose agricultural skill and intelligence deserve the highest respect, says, that he has found an effectual security against the bee moth by placing his hive in a bee-chamber above the floor, on slats or stakes so as to leave the bottom open and exposed. The moth then is not able to make a lodgment ; or his webs, if he forms them, may be easily seen and removed.

MISCELLANEOUS MATTERS.

I. **SUN FLOWER FOR OIL.** Some few years since an attempt was made in the northern part of the county to cultivate the common sunflower for the purpose of expressing the oil. Fifty cents a bushel were promised to farmers who should raise it. It was unsuccessful. The cultivation was more expensive than that of Indian corn. Twenty bushels were the largest crop I could hear of to the acre ; but this was an inferior crop. Owing to imperfect machinery or want of skill, one gallon of oil, valued at \$1.17, was all that was obtained from six bushels of seed.

II. **BEET-SUGAR.** A few pounds of beet Sugar, the first, probably made in New England, were made this year in Salem by Pickering Dodge. It was well grained and of a good quality. He has been kind enough to furnish me with a detailed account of the process ; but, as it was a first experiment, and the apparatus for the manufacture, of an imperfect description, and such as could be got at the time, I deem it unnecessary to give any further statement, until I come to report more fully on the whole subject.

* Appendix 1.

III. SILK CULTURE. No claim has been made the present year from Essex for any portion of the State's Bounty, for raising or reeling Silk. The *Morus Multicaulis* on which great dependence was placed, has failed through the severity of the winters. A small but beautiful example of cocoons and raw silk were shown to me in Amesbury ; and some silk handkerchiefs of a fine description were produced and manufactured in Lynn, under the care of Edward S. Davis.

The silk culture is destined to become a great source of wealth to New England ; and there is no reason why Essex County should not fully share in its benefits.

IV. MILK WEED. Experiments have been made with the stalk of the common milk weed, in procuring from it a thread or fibre, capable, as was represented, of making a fabric as fine and strong as flax or silk. A patent was secured for the discovery, but it has not been pursued.

V. MANUFACTURES. There are various manufactures pursued in the county intimately connected with its agriculture ; but for these I refer to the Statistical Tables of the Manufactures of Massachusetts.

The Linen Thread Factory at Andover, where flax is spun by machinery like cotton, is confined to the making of twine for sail-makers. The flax employed is almost wholly obtained from the state of New York. They consume 150,000 lbs. per year. They pay for it ten cents per pound in Troy. The farmers there obtain 300 lbs. to the acre, and 12 pounds of seed would be a good yield. The flax which is cut in the flower is preferred to that which is ripened. The former is soft, the latter tough. The superintendent states that the water-rotted flax of Scotland is much superior to ours, which is dew-rotted. He speaks of the Friesland flax as preferable to any other ; and so considered in Scotland. It is stronger and may be spun finer. Flax is scarcely cultivated in Essex. It is considered an exhausting crop, and it will not do in a rotation oftener than once in five years.

VI. KEEP OF OXEN. Facts connected with the expense of feeding farm animals are always important ; and therefore I state that at Sandy Bay, the oxen employed in stone work, have been found by careful experiment, to require 25 lbs. of hay and four quarts of Indian meal to each ox per day.

VII. SLAUGHTER HOUSE OFFAL. An arrangement at the Poor House in Danvers is so creditable for its economy, that I shall here insert it, as it was related to me by the superintendent. The whole management of the establishment, as well within as without the house, is excellent.

A contract is made with an extensive slaughtering establishment, two miles from the house, to purchase all its offal. The carts are to be sent for it once a day in the autumn, and twice a week at other seasons. They agree to pay 32 cents for the offal of every beef, animal there slaughtered. The offal of other animals, calves, sheep, or swine, killed there, is not charged. The proceeds are then subjected to the following assorting process :

From four to five pounds of clear meat are usually taken from each head, which is used either in a fresh or salted state by the inmates of the house. The heads are then boiled for the extraction of the tallow, and then thrown to the swine. After being thoroughly picked by them, they are gathered up and sold to the sugar boilers, for the purpose of making animal carbon for the refining of sugar, at \$4.50 per ton. The jaw bones are sold to the button makers, at 62½ cents per hundred ; the leg bones, to the same manufacturers, at \$20 per thousand. The claws of the hoof are sold to the comb makers at ¾ cent per piece. The skins from the legs are sold to the glue makers at 1¼ cent per piece, or \$5 for four hundred leg bones ; and from the feet is extracted the oil of which 250 gallons were made the last year, 1836. A considerable amount of tallow is obtained from each offal, amounting the last year, 1836, to 3,500 lbs. which sold for 10 cents per pound. Upon the offals a large number of swine are profitably maintained, and fattened with a moderate allowance of other food. The amount of valuable manure made in this way is no small item in the account.

VIII. PEAT FOR FUEL. The peat meadows in Essex are extensive, and constitute a valuable resource to the inhabitants for fuel. In Wenham an intelligent farmer states, that the peat meadows yield about three cords of peat to a rod, by going two feet after the sod is taken off. The sod which is taken off is usually thrown back into the ditch ; and after it is cut over in this way for peat, the land is considered worth \$25 dollars an acre for the grass which may be got from it, a coarse aquatic grass. It is not determined how many years will be required to restore the meadow to its former consistency. At the rate of three cords to a rod, an acre of good peat land will yield 480 cords. The peat is ordinarily worth \$3 per cord ; if well cured by being housed, much more than this. It may be cut and cured to the halves. It is stated in English publications, that peat may be charred to advantage, and be converted in this mode into an excellent fuel free from all offensive odor. For this reason I caused some to be charred in Salem, but the result was not favorable.

In Rowley the yield of peat land is rated at the same as above. They consider peat as three fourths of the value of oak wood. At Ipswich it brings \$5 per cord. The digging and carrying out of a cord of peat is considered a day's work. The labor in getting peat is regarded the same as getting wood and preparing it for the fire. There are in Rowley one thousand acres of peat land.

IMPROVEMENTS.

Great improvements have been made in the county in the management of salt marsh by ditching, draining, and dykeing.

The average yield of salt marsh, is from three fourths of a ton, to one and a fifth, and one and a half tons. A farmer in Salisbury, and one in Ipswich, speaks of the importance of draining salt marshes. The latter states that on 12 acres of marsh, where formerly he obtained four tons only, he now gets twelve tons, simply from draining the marsh. Another experienced farmer says, "it is always useful to drain salt marshes if men would only have patience to wait for its effects." Two other farmers, whose judgment deserves

great respect, say that "salt marshes must not be drained unless where the water stands upon them ; or unless the meadow has a soft bottom." If the alluvion is shallow and rests on a hard pan, the draining will injure it. A farmer in Lynnfield says, "that salt marshes should be ditched, not drained"; by which I understand him to mean that the object aimed at is not to take the water away from the bottom or roots of the grass, but to remove it from the surface. I submit these authorities without comment on a subject in which I am not much versed.

Great improvements have been made in dykeing salt marsh ; and effectually excluding the salt water.

I. The first is an improvement in ten acres of salt marsh diked on Kent's Island, Newbury. I shall subjoin the owner's account of it, in the letter which he was kind enough to address to me.* He has been amply compensated for the experiment. One circumstance is remarkable, that the breaking of the sod was injurious. The plain inference from this will be confirmed by a statement from Gloucester. From a thorough examination of this reclaimed meadow, it is my belief, that the application of two or three inches of clay or loam upon it, where it has not been dug over for peat, and the sowing of English grass seed would make it in the highest degree productive. The intelligent owner has kindly promised to test this matter, of the favorable result of which I have no doubt.

II. A second experiment in dykeing salt marsh is now going on at Ipswich. A tract containing 103 acres has been dyked about three years ; the expense of dykeing, as the situation was particularly favorable, was \$355, at \$4 60 per acre. The dyke is 55 rods in length, 12 feet at bottom, 4 feet at top, the height varying ; but in the creek the bottom is increased to 20 feet. I have an account of nine acres of this dyked meadow, which may be considered a fair sample of what may be expected from the remainder. The year before the dyke was made the produce of this nine acres was not considered worth the expenses of gathering. The first year after the dyke was made, the nine acres yielded 3000 lbs. of hay ; the second year six tons ;

* Appendix K.

the third year, that is the last, $14\frac{1}{2}$ tons of hay have been sold from these nine acres, at \$12 per ton. Nothing has been done to this marsh other than to sow it with grass seed every year since it was diked. The first year the grass seed took but very imperfectly, as the saltness had not been removed. I hope the application of loam mixed with clay and the land then manured, will be tried here.

III. The third experiment in reclaiming salt marsh has been made in Gloucester. The town enclosed a piece of salt marsh and effectually excluded the salt water from it. The experiment was unsuccessful where they broke and cut up the surface from an opinion that this would render it more productive. The opposite result occurred. A piece of salt marsh adjoining this was dyked; the following is the account of this piece given at my request by a respectable gentleman, well acquainted with its management and condition. "The Marsh land was diked in 1814. For four years after the salt water was shut out, grass seed was sowed on, with a liberal supply of manure mostly collected in the streets; since which every other year it has been well covered with stable manure, spread over it in the winter. No land in this vicinity has afforded such abundant crops of hay, having never failed to produce four tons of best quality of hay to the acre at twice mowing; and then feeding it close every autumn with cows.

"I have noticed the destructive effects produced by breaking the sod with a plough or harrow on marsh well diked. That which joins the piece above described, when turned up, dried into a substance resembling cork, and seemed to have no appearance of decay. The piece first described could now be ploughed with ease if it should be necessary, presenting a fine rich mellow soil, the sod being entirely decomposed." This is the condition of the soil of the dyked meadow on Kent's Island, spoken of above. Other experiments in dykeing salt marsh have been made known to me; but not with sufficient exactness to be made the subject of my report.

Great improvements have been made in reclaiming low wet land or fresh meadow. In some cases it is ditched and the contents of the ditches thrown on to the land, which is thus raised in the middle, and sown with English grass seed. In some cases after being drain-

ed, gravel and loam have been carted on, and grass seed has then been sown with success. In cases where the lands can be conveniently ploughed after being drained, they are ploughed and harrowed, and at once laid down with oats and grass. Two of the best farmers, who have experience in the management of this kind of land, are of opinion that sand is a much better application to these lands than gravel. Their yield in grass, after they are thus treated, is most abundant.

IV. One of these gentlemen whose redeemed meadows though not of peat, yet are of a peaty character, has found this sort of land, after it was thus "brought to," extremely favorable to the growth of rye. He applied sand and gravel, and manured the land with ashes, and the scrapings of the street ; and from one-eighth of an acre, and four quarts sowing, he obtained $5\frac{3}{4}$ bushels of rye. The land afterwards produced two tons of hay to the acre. His redeemed meadows, he says, have sometimes produced four tons to the acre.

The improvements of this kind throughout the county are very numerous and valuable. My limits will allow me to speak of but two other individual cases.

V. On one of the farms to which I refer there were seventy acres in low meadow, which, before its recent improvement, were saturated with water, and produced nothing better than a coarse swale or water grass. They were inaccessible to cattle, excepting in the driest season, and abounded with hassocks, flags, and rushes.

The soil of this extensive meadow is a bog of dark mud, decayed vegetable matter, varying in depth from eighteen inches to several feet ; resting upon clay highly charged with sand, and when dry becoming friable. The owner has effected a great improvement in draining a large portion of this meadow, and changing its produce into English hay of the finest description, herds grass, clover and red top. The whole meadow is under the same process of improvement, and in a short time will probably be altogether reclaimed, presenting one of the most skilful and successful operations of the kind to be found in the state.

The farmer began by cutting one large open drain or ditch

through the centre of the meadow, and for its whole length. This drain is four feet wide at the top, and goes down some small depth into the clay pan. Cross drains are then cut on both sides at right angles with the main ditch, and made to empty themselves into it. These drains are carried down into the hard pan, and vary in width from eighteen inches to three feet, according to the quantity of water, which they are likely to be required to carry off. They extend from the main ditch to the margin of the meadow. The cost of the main ditch was not ascertained ; but ten cents a rod by contract were paid for making the side drains. The materials thrown out from the ditches were immediately spread evenly upon the meadow, and with the best advantage.

The next step was to plough the meadow thus ditched and drained in the autumn, and in the ensuing spring to sow this ground with oats and grass seed, which were sowed on the furrow and harrowed in. Of oats he sows from three to four bushels to the acre ; of grass seed, half a bushel of herds grass, one peck of red top, and one pint of clover. After this in the winter time he manures the land upon the oat stubble. He collects the night soil in the neighboring town. With one cord of night soil he puts four cords of gravel or loam ; of this mixture he puts ten cords to an acre, or twenty loads to an acre, spreading it as evenly as possible. He designs to manure his land in this manner once in four years, and let it remain permanently in grass. His experiment so far has been successful, his meadows yielding an average of two tons of the best English hay to an acre. In some cases he has tried the effect of spreading clay from the bottom of his ditches, a clay strongly mixed with sand, upon his meadows, and finds it in its effects equal to the best manure.

One measured acre, covered with hassocks, and producing only the coarsest water grasses, he first drained completely ; then cut the hassocks close to the ground while it was frozen ; put on a quantity of gravel and manure ; sowed it with grass seed ; and harrowed it as usual. From this acre he mowed four and a half tons of English hay in one season.

He has obtained from one measured acre of his meadow, manured in the hill with green barn manure, four hundred bushels of potatoes. This he states as an average crop in such land thus managed. From twenty acres in oats, cultivated as above described, he obtained one

thousand bushels of oats. The above crops grew upon land which had never before been ploughed. The acre of grass above mentioned has never been broken by a plough.

The extent of ditches cut upon his place exceeds four miles.

He has this year fifteen acres in oats ; three in corn ; three or four in potatoes.

VI. The next account I shall give is of an experiment now in progress, which for various reasons will be found interesting. It shows in a striking view what may be accomplished by enterprise and perseverance. I shall give the account in the words of the individual, whose letter is before me.

“ The land in question a year ago last August (that is 1836) was grown over to blueberry, alder and briar bushes, and some young maples ; a growth of maple having been cut from it four or five years ago.

I mowed these bushes a year ago last August : cost of labor,	12 00
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The quantity of deep meadow is about six acres. One and a half or two acres on the edges of this meadow produced a small quantity of poor hay.

Expense of digging a new ditch and cleaning out other old ones,	30 00
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Paid for labor on the meadow,	300 00
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For tools, \$12 ; for board, \$150,	162 00
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Expenses,	\$504 00
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The quantity of wood got out of this swamp, as nearly as I can estimate it, is about two hundred cords. The stumps and trees were from one foot above to two or three feet below the surface. The trees or logs were from ten to sixty feet in length. They appeared to have been blown down, and the meadow to have been formed over them. The wood is mostly stumps ; the sap being gone, and the heart left perfectly sound. I dug three large stumps, one on top of the other, like tea cups the bottom side up ; and under these was the heart of a pine tree, which had been burnt some time or another.

The wood that I have made into coal I did not cord ; but there were twelve hundred bushels of coal. Allowing fifty bushels to the cord, as some estimate it, there would be twenty-four cords of wood.

Eleven hundred and twelve bushels of coal, sold for	157 00
Paid for burning and marketing,	40 00
	117 00

The wood when cut fit for a cook stove is worth \$4 a cord ; the expense of cutting \$2 a cord.

I have now on hand, as nearly as I can judge, 175 cords of wood, worth as it now is, \$350 ; but when coaled or cut fit for market, double that amount. Wood,	350 00
Proceeds,	\$467 00

The land at the present time I value at \$100 per acre, and my object is to get it into English grass as soon as I can."

VI. A farmer, whose success is the best test of his skill, thus describes his method of cultivating his level clay lands, and bringing them into very productive mowing lands. "The soil is about five inches deep on a hard clay bottom. I plough about five inches deep usually in the fall, in lands about thirty feet wide, that the water may drain off in the furrows. I usually plant with potatoes manured in the hills, with about four cords of stable manure to the acre ; and usually have produced 200 bushels to the acre. The next season, I take a harrow with teeth, with a shoe on the bottom of each tooth, about five inches broad, and running to a point ; and harrow two or three inches deep. I then spread 200 bushels or more of leached ashes to an acre ; and sow half a bushel of herds' grass seed, and two bushels of oats to the acre. I have usually had from 40 to 50 bushels of oats to the acre ; and the next season, about two tons of hay to the acre. I think it best not to plough up the sod."

VII. One of the most extraordinary cases of general improvement within the county, is to be found in Sandy Bay, a parish of Gloucester. Any person, who has visited this village, at the ex-

tremity of Cape Ann, knows that nothing in an agricultural view can be more forbidding. Forty years ago, a farmer, who, looking mainly to the ocean for subsistence, had the courage to plant himself among these elder-swamps, huckleberry bushes, frowning hills of granite, and rolling boulders, was not able to keep a single cow without procuring hay for her support, from Essex, or Rowley, or Newbury, a distance of several miles, has become now a large seller of hay. In 1832 and 33, he had two acres of Indian corn, yielding 80 bushels of sound corn to the acre. In 1830, he gathered from six manured acres sowed to winter rye, 21 bushels, or more than 35 bushels to an acre; and 14 acres of such land, if land it may be called, which you can scarcely find among the overhanging masses of granite, have produced 30 tons of English hay for the first crop, seldom worth less than \$20 per ton. The average yield of their mowing land is always rated at two to three tons to an acre. Their mowing land they value at \$300 per acre, because it will pay a handsome profit upon that price. This little despised territory, which within so few years imported all its produce, at a recent valuation, is thus reported:

Crops.

Hay, . . . 845 tons,	Oats, . . . 130 bushels.
Indian Corn, 690 bushels.	Potatoes, 8635 “
Rye, . . . 390 “	584 acres cultivated.

It now has a considerable amount of agricultural produce for sale. Much of this productiveness is effected by the use of sea manures, particularly fish garbage, of which they usually apply ploughed in six or seven loads to the acre. Its effects are powerful.

FARM REPORTS.

Out of a considerable number of Farm Reports, which have been given to me, I have selected a few rather incidentally than otherwise; and from different parts of the county, that a fair specimen may be presented of the condition of its agriculture.

FARM I. This farm consists of $49\frac{1}{2}$ acres, of which 16 are in

pasturage and one waste. The live stock on the farm is horse 1 ; oxen 2 ; cows 6 ; swine 6.—Produce in 1837 : English hay 16 tons ; meadow hay 1 ton ; Indian corn 16 bushels ; beans 11 bs. ; potatoes 500 bs. ; onions 2 bs. ; beets 4 bs. ; ruta бага 100 bs. ; buckwheat 25 bs. ; pork 675 lbs. ; butter 750 lbs. ; winter apples 60 barrels ; corn fodder 1 ton ; calves sold 5, at \$5 each. Total amount of sales, \$469 ; value of produce used, or on hand, \$425 ; cost of labor and incidental expenses, \$330.

FARM II. This farm consists of 43 acres in the whole ; of which 15 are in wood, 12 in pasture, 1 wet meadow, 3 waste ; 6 in English mowing, and 6 in tillage. The appearance of the crops seemed to me so remarkable, that I agreed with the farmer to have his land surveyed, and his crops exactly measured. Here follows his statement:—"I have had my hay land and my tillage also surveyed, as you required. The exact amount produced on certain quantities I will give. On 56 rods of land or a lot 7 rods wide, and 8 rods and 2 links long, I cut 1 ton and 1527 lbs. of hay. On 37 rods of land I raised $9\frac{1}{2}$ bushels of rye. On $16\frac{3}{4}$ rods I raised $11\frac{1}{4}$ bushels of barley. On 24 rods of land I raised 52 bushels of potatoes."

"There is another lot of land adjoining the above, of the same size and equally good, which produced only 1993 lbs. of hay. This shows clearly the effect sea-weed has on hay land, for the one had 17 loads put on it, which cost me \$2, and the other had none. Both lots were laid down in 1827, and always produced alike when dressed alike. The lot on which I raised my potatoes, I dressed three years with barn manure. Finding the product small in two ways, small potatoes and small crop, in October I spread over the lot 12 loads of fish dressings, (fish garbage, entrails, &c.) this I ploughed in. This I have done two years in succession, and find the product to be more than one quarter greater than before. I should recommend to any farmer, who can obtain it for the laying down land to grass, or on tillage land, one load in preference to two loads of barn manure. On a lot of 49 rods of land, I raised $10\frac{1}{2}$ bushels of corn this year, planted the 10th of June and taken off October 5th. This is what we call Canada corn ; a kind I never planted here before." The whole produce of this place is as follows: English hay 14 tons ;

fresh meadow 2 tons ; Indian corn 20 bushels ; rye $9\frac{1}{2}$ bs. ; barley $11\frac{1}{4}$ bs. ; pease 2 bs. ; beans $3\frac{1}{2}$ bs. ; potatoes 210 bs. ; onions 3 bs. ; beets 5 bs. ; English turnips 14 bs. ; pork 967 lbs. ; butter 426 lbs. ; calves sold 4, average price \$7.25,—\$29.

FARM III. No. of acres, 118. Of these, 50 in pasturage ; 13 in wood ; 30 in salt marsh ; leaving 15 in English mowing, and 10 in tillage. Produce in 1837 : English hay 30 tons ; black grass 25 ; salt hay 20 ; Indian corn 150 bushels ; oats 200 bs. ; potatoes 1,100 bs. ; onions 275 bs. ; winter apples 130 barrels ; cider 13 barrels ; beef 800 lbs. ; pork 700 lbs. ; butter 100 lbs. ; new milk cheese 400 lbs. No account of calves sold or raised.

It will be remembered that the years 1836-7, were extremely unfavorable to corn ; but it deserves mention, that in the granaries of several farmers I found large amounts of old corn on hand. They remember Joseph in Egypt, and are always prepared with commendable providence for a year of scarcity.

FARM IV. This farm consists of 103 acres. Pasture 35 ; wood 20 ; wet meadow 8 ; waste 9 ; leaving in tillage, English mowing, and orcharding, 31 acres. The number of cows is 8.

Produce 1837. English hay 25 tons ; fresh meadow 5 tons ; Indian corn 132 bushels ; oats 35 bs. ; beans 3 bs. ; potatoes 300 bs. ; carrots 140 bs. ; sugar beets 125 bs. ; parsnips 2 bs. ; English turnips 90 bs. ; ruta бага 60 bs. ; squashes 1 ton ; pumpkins 2 tons ; winter apples 100 barrels ; summer and other varieties 200 bushels ; straw $1\frac{1}{2}$ ton ; corn fodder 6 tons ; pigs sold 5, average price \$6 ; calves sold 7, average price \$8.35 ; pork 1406 lbs. ; butter 950 lbs.

Beef animals fattening in 1837-8. Number, 4. On boiled potatoes, apples, and cob meal, (with ruta бага, sugar beets, &c., uncooked.) Pair of oxen to be killed in March, probable weight 2,100 lbs. ; two cows do. 1,200 lbs.

His swine likewise are fattened on boiled apples, potatoes, and cob meal. Of the use of apples, for fattening beef and pork, with other feed, he speaks in strong terms. He thinks the use of apples boiled for his swine saves him half the quantity of meal, which he has before been accustomed to use, in fattening the same amount of pork.

The Shakers at Canterbury, New Hampshire, who are among

the most intelligent and skilful farmers in the country and have been kind enough to favor me with a full report of their farming operations, confirm this opinion of the value of apples by their own experience. They state that in fattening their usual amount of pork the year before the last, by the use of one third of apples cooked with their potatoes, they considered themselves as having saved \$200 worth of Indian meal.

The gentleman of whose farm I am now speaking, obtained two years since, on a piece of land of $3\frac{1}{2}$ acres and 26 rods, at the rate of 95 bushels of Indian corn to the acre.

FARM V. This farm contains 100 acres, of which 50 are in pasture ; 24 in wood ; 10 in salt marsh ; 10 in English mowing ; 4 in tillage ; 2 in wet meadow. Cows 6 ; oxen 4 ; swine 2 ; horses 4, kept mainly for the purpose of carting hay to market on commission.

Produce. English hay 12 tons ; salt hay 30 tons ; Indian corn 75 bushels ; barley 30 bs. ; oats 40 bs. ; beans 3 bs. ; potatoes 500 bs. ; beef sold \$262 ; pork 500 lbs. ; butter 300 lbs. ; new milk cheese 900 lbs. ; cider 26 barrels. ; winter apples 200 barrels ; straw 2 tons ; corn fodder 2 tons ; pigs sold 3, at \$3.25—\$9.75 ; calves sold 5, at \$7—\$35.

The extraordinary crop of salt hay stated above, of which I have unquestionable testimony, is to be attributed to superior management of the salt marsh, and its particularly excellent character. It has been carefully drained, so that the water is immediately, as the tide falls, taken from its surface. It consists of a deep alluvion resting in some parts upon a clayey substratum.

FARM VI. This farm consists of 110 acres of which 30 are in pasturage ; 20 in salt marsh ; 20 in wood ; and 7 waste ; leaving 33 in tillage and English mowing. Cows 5 ; oxen 4 ; horse 1.

Produce in 1837. English hay 20 tons ; salt hay 15 tons ; fresh meadow 2 tons ; Indian corn 300 bushels ; barley 40 bs. ; oats 20 bs. ; pease sold green 200 bs. ; beans 10 bs. ; potatoes 50 bs. ; onions 75 bs. ; carrots 10 bs. ; beets 30 bs. ; parsnips 6 bs. ; English turnips 150 bs. ; pumpkins 50 cart loads ; squashes sold for \$100 ; beef fattened 3,600 lbs ; pork 1,500 lbs. ; butter 750 lbs. ; cider

17 barrels ; winter apples 120 barrels ; pigs sold 6, average price \$10 ; calves sold 4, average price \$5. Beef. In fattening beef made great use of pumpkins. Swine were fattened on pumpkins, barley meal, and potatoes. Manures applied, 15 cords to the acre, principally barn manure.

Amount of sales in 1837, \$1,600. Value of produce used or on hand \$886. Cost of labor and incidentals \$575. Manure made supposed 60 cords ; manure bought 50 cords. Nothing is here credited to the farm, as I suppose, for supplies used by the family of vegetables and milk ; nor for house rent.

FARM VII. This farm consists of 108 acres ; of which 50 are in pasturage. The live stock consists of 1 horse ; 6 oxen ; 7 cows and heifers ; 7 swine.

The produce for 1837 is as follows. English hay 60 tons ; low meadow 12 tons ; fresh meadow 4 tons ; Indian corn 173 bushels ; oats 350 bs. ; potatoes 700 bs. ; winter apples 175 barrels ; pork fattened 1,700 lbs. ; cheese, the night's cream taken off, 400 lbs. butter 700 lbs. ; straw 10 tons ; wood sold 50 cords ; calves sold 5, at \$4 each ; manure made 60 cords ; manure bought 15 cords, at \$3.50 per cord.

The amount of sales given for 1837, is \$1,350. The cost of labor \$280. The value of produce on hand is not stated. The cost put down for labor means, undoubtedly, wages paid exclusive of the owner's care and labor ; the board is considered as furnished by the farm, and nothing is put down for incidental expenses.

It is much to be lamented that farm accounts every where, if kept at all, are kept with so little exactness ; and that one of the most important business concerns in life is pursued with so little exactness of calculation or cost.

This farm has this year been honored with a liberal premium from the Essex Agricultural Society, and a gratuity from the Massachusetts Agricultural Society ; and a full and detailed account of its management will be found in their reports.

FARM VIII. This farm consists of 334 acres. 169 in pasturage ; 22 in wood ; leaving in tillage, mowing, and orcharding 143 acres. The live stock consists of cows 20 ; oxen 6 ; swine 25 ;

and horses 8 ; which are used for marketing meats and other purposes, not connected directly with the farm.

Produce in 1837. English hay 80 tons ; fresh meadow 8 tons ; Indian corn 150 bushels ; Rye 40 bs. ; barley 633 bs. ; oats 570 bs. ; pease sold green 150 bs. ; beans 6 bs. ; potatoes 2,300 bs. ; onions 50 bs. ; carrots 400 bs. ; beets 75 bs. ; parsnips 10 bs. ; English turnips 300 bs. ; pork 8,700 lbs. ; butter 200 lbs. The milk was principally sent to market ; cider 10 barrels ; winter apples 30 barrels ; straw 40 tons ; corn fodder 14 tons ; wood sold 35 cords ; calves 20, killed and marketed, average price \$10 ; sheep fattened 20.

The whole amount of sales reported in 1837 is \$4,052. Value of produce used or on hand \$3,358. Cost of labor and incidental expenses \$2,550.

FARM IX. Extent 160 acres. Of this farm, which I have repeatedly visited, I have no returns for 1837 ; but in 1834-5, the produce was as follows. English hay sold 184 tons ; potatoes grown 1,541 bushels ; corn 300 bushels.

The improvements on this place, within twenty-five years, are immense. It has extraordinary advantages for obtaining sea manure of various descriptions ; and this is applied without stint.

FARM X. I shall add to these statements an account with which I have been favored by the Treasurer of the Institutions for Education at Andover. A farm of fifty acres is connected with each of the three Institutions—the Theological,—the English,—the Latin School. The improvements, which have already been made upon these different lots, are judicious and excellent.

“ANDOVER, November 25, 1837.

“It will be recollected that the object of our farming is somewhat peculiar. Our aim is to obtain *milk* for our commons. This is our first object, and our husbandry is managed with a view to this primarily. We raise potatoes principally, rather than corn, because potatoes turn to a better account to produce milk than corn. The ground that we sow down to grass we sow down with oats ; and cut

Potatoes,	-	-	-	-	-	-	-	1450 bushels.
Corn,	-	-	-	-	-	-	-	38 do.
English Turnips,	-	-	-	-	-	-	-	90 do.
Onions,	-	-	-	-	-	-	-	70 do.
Carrots,	-	-	-	-	-	-	-	25 do.
Beets,	-	-	-	-	-	-	-	50 do.
Parsnips,	-	-	-	-	-	-	-	30 do.
Winter Apples,	-	-	-	-	-	-	-	39 barrels.
Cider,	-	-	-	-	-	-	-	3 do.
Beans,	-	-	-	-	-	-	-	4½ bushels.

“ The rude and rough state of our lands at the commencement of operation has afforded but small opportunity for nice observations and experiments. We have done considerable at underdraining our low and wet grounds to very great advantage. We have paid no particular attention to our breed of cattle. It is not convenient for us to raise young stock, and we have bought our cows and oxen, principally of common native breeds. We generally purchase our oxen in the spring, do our summer work with them, and turn them for beef in the first of the winter. As to manure we have made no important experiments. We have repeatedly tried gypsum, but without any important effect. Lime we have not tried to any extent. We have not raised any crops that would be considered extraordinary. Seventy bushels of corn to the acre is the most that we can boast of, and eight hundred bushels of carrots. Our milch cows are of the common kind.”

I have been favored with many more reports showing similar results, but until I better understand what the public wishes require, I hesitate at enlarging my report with them. I have personally visited all the farms, which I have reported, with one exception; and that I did not go over because of the owner's absence from home at the time of my calling. The statements, which I have given, rest with a single exception upon the written and certified reports of the gentlemen, to whose farms they relate; and their credibility is in my mind unexceptionable. If there are errors, they must be errors of judgment or accident, and not of design. I am not at liberty with-

out their permission, excepting where they have been the subjects of public premium or are connected with some public institution, to subjoin their names ; but the public spirit, which has induced them to make these communications, is much to be applauded.

I have taken special pains to visit every Pauper establishment in the county with which a farm is connected. I have accounts from many of them, which are interesting and instructive, but I fear to extend my report. Their condition and management in general are respectable and encouraging. The condition of the unfortunate inmates is enviable compared with what it was in former times, when no out-door labor was provided for them ; and their labor applied in this way does much to relieve the towns from the burden of their expense. In only a single instance have I found any allowance of spirituous liquor ; and very rarely the use of any fermented or intoxicating drink among them. This is an immense advance in civilization and humanity. It struck me as greatly desirable, if consistent with the ends of public justice and the security of the wretched vagabonds and convicts who are committed to these places, that the county Houses of Correction should have a farm connected with them, where the labor of the inmates, which is now applied with little comparative advantage, either in point of pecuniary profit, health, or morals, might do much towards their support if devoted to agriculture or gardening. There are insular or peninsular situations to be found, combining every advantage for this object, where the perfect security of the convicts might be assured at an expense not greater than is now incurred.

The condition of the population of Essex, before the recent financial derangements and calamities in the country, was singularly prosperous and thrifty. The extraordinary gains acquired in mechanical and manufacturing employments, though it increased the demand for agricultural products, tended to withhold from agriculture much of the labor and intelligence, which would otherwise have been applied to it ; and to encourage a distaste for it as a severe and unprofitable pursuit. The extraordinary reverses, which have taken place within the last two years, have drawn attention and labor more strongly to the earth as a bank sure not to fail ; always ready to honor the drafts

of labor directed by skill and intelligence, and certain to pay the just demands upon it in that which is better than specie, plenty of food and clothing, domestic comfort, health, and peace of mind. It is a gratifying fact, in which I am confirmed by my own as well as the observation of others, that more land has been cultivated, and more unproductive land has been drained and redeemed within the last year, in the county, than has been done for many previous years. The facts detailed in this report will demonstrate that capital and labor may be applied to agriculture in Essex County with a perfect security, under intelligent and skilful management, of an ample return. It is not to be concealed, however, that agriculture, to be successful, requires application, labor, science, experience, skill ; and, according to the objects aimed at, and the measure of profit to be expected from it, pecuniary capital. It is said that any man may be a farmer. Success in agricultural pursuits is just as certain, but it is no more so, than it is in commerce and manufactures ; and upon no other conditions.

The silk culture may be made matter of most profitable attention in Essex. I say this with strong confidence, from some actual experiments detailed to me in the cultivation and management of the *Morus multicaulis*, the results of which may be said almost to guarantee success, as far as this depends on that invaluable plant. These results I design fully to detail in the report, which will follow this. Essex has taken the lead in the manufacture of beet sugar in America ; and I have strong reason to hope that it may be followed up to great advantage ; and on this matter I shall give the information, which has been recently received, and promises to be of great public advantage.

The main hindrances to the progress of Essex agriculture are either the want of capital of those who pursue it exclusively, or in other cases, that it is merely a secondary object, subsidiary to something else. Every farmer seems disposed to boast with how little labor he gets along. My belief is, and it is confirmed by the facts stated in this report, that much more labor, even at the present high prices, might be profitably applied ; or else, indeed, none can be profitably applied. Hay and oats are deemed the best crops, for the simple reason that they are managed with less labor than other crops ; and at the same time are always sure of a cash sale. Oats are an ex-

hausting crop, as is universally admitted ; and hay that is marketed deprives the farm of manure. My belief is, that the extended cultivation of grain crops, such as Indian corn, barley, or pease, and of vegetable crops, such as ruta бага, potatoes, carrots and beets, to be consumed on the place, or, if sold, sold only in the form of grain, or pork, or mutton, or dairy produce, butter in particular, would be doubly profitable ; and render our agriculture an improving, rather than, as it often is under the hay-selling system, an exhausting operation. The introduction of the plan of sowing clover with all grains, to be ploughed in as a green dressing, and other green crops, demands attention. The composting of manures, the application of clay marls, which it is believed may be found abundantly in the county, and the uses of lime, deserve immediate and exact inquiry and experiment on the part of the Essex farmers.* The draining of their fresh meadows, and the preparation of them for English grasses, and the dykeing and draining of their salt marshes, would add immensely to the productive wealth of the county.

AGRICULTURAL SCHOOLS.

Two literary institutions, one at Beverly, and one at Byfield, are designed in some measure to connect agricultural or mechanical labor with literary education and improvement. They are in this matter as yet in embryo. The latter has ample means in a valuable landed estate contiguous to the school. The former has purchased a valuable estate, and design to apply to the government of the state for aid. Some capital is found necessary in the outset ; but I have a strong persuasion, that the introduction of the cultivation of silk in such seminaries where favorably situated, without materially interfering with the literary improvement of the pupils, may do much, under skilful management, towards defraying all the necessary expenses of the establishment. The education which is the fruit of our own honest industry is of vastly more value to the character and self-respect of its favored subject, than that, which is the gift either of public or private charity.

* Appendix L.

AGRICULTURAL SOCIETY.

The Agricultural Society of Essex was founded in 1818, under the influence of an eminent friend to agricultural improvement and a skilful practical farmer, Timothy Pickering. It embraces nearly all the farmers in the county. Its funds invested amounted at the close of the year 1836 to \$6500. Besides the income received from these, it receives \$600 from the bounty of the state. These funds are applied to the payment of premiums on matters and things connected with agricultural improvement ; and to the publication of an annual report of the awards and doings of the trustees. A list of premiums offered, and the subjects on which they are proposed to be paid, is annually published ; and a cattle show and exhibition is annually held in some town of the county.

The affairs of this society have been managed in the most skilful and public-spirited manner ; and its influence has been marked and eminently salutary on the agriculture of the county. The trustees have published two volumes of Annual Reports of their Transactions, which imbody a great deal of instructive and valuable information on subjects of agriculture and domestic economy.

My conviction is, that the agricultural interests of the county would be greatly promoted, if their annual show and ploughing match were extended to two days instead of being crowded into one ; and if their premiums were given in some permanent memorial of books, or plate with suitable inscriptions, rather than in money ; and besides this, if as far as practicable, they were publicly awarded and bestowed on the second day of the festival. These opinions are strongly confirmed by my observations at the spirited exhibition of the Berkshire Agricultural Society the last autumn ; and are respectfully suggested to the consideration of the trustees of a society, which stands in the first rank of the agricultural institutions of the country.

APPENDIX.

[A.]

Instructions of the Executive to the Commissioner for an Agricultural Survey.

BOSTON, 15th JUNE, 1837.

SIR,

Having accepted the place of Agricultural Surveyor of the Commonwealth, you will enter on the discharge of its duties with all convenient despatch. You will consider it of course the great object to carry into effect the Resolve of the Legislature under which you are appointed; as far as depends on the Surveyor, omitting nothing directed by it; nor including what is not embraced in it; giving it a liberal, but not a loose construction; and, in doubtful matters, referring to the Report of the Committee, by which the Resolve was introduced, as a safe guide to its interpretation.

An Agricultural Survey of the Commonwealth is, of necessity, an undertaking of a character somewhat indefinite. A very general and summary survey, such for instance as would be made by an intelligent tourist, would be the work of a few weeks, and would, by no means, be without interest. On the other hand, a survey might be projected, so comprehensive in its plan, and so minute in its details, as to require a long term of years to carry it into execution. The information, which might be collected by such a survey, would no doubt, also be valuable. But it is not presumed, that the Legislature contemplated a survey of either description, as the one would be too superficial to afford much knowledge that would be practically useful, and the other would be too expensive, too voluminous, and too long de-

layed, to meet the views supposed to be entertained in passing the resolve. To find, and preserve the proper medium, will require much discretion, and good judgment; and confident reliance is had upon your disposition to bring the survey into the narrowest limits, as to expense and time, consistent with its great objects. As to expense as it of course cannot exceed the appropriation, so it is desirable that it should be brought as far within it as practicable, without sacrificing the objects of the survey. The amount of your compensation will be submitted to the Council for their consideration, at the next meeting of the Board.

You will, from time to time, as you may accomplish such portions of the survey as may be safely published, communicate the same to the Executive; and, it is considered highly desirable, that an ample specimen of the work should be in readiness, to be laid before the General Court at their session in January next.

Provision having been made, at the last Session of the Legislature, for a mineralogical, geological, botanical, and zoological survey of the State, with a view to agricultural benefit, it is submitted to you, considering the great extent and variety of objects, properly falling within your commission, to treat more summarily those, which are included within the province of the other surveys; as, for instance, the chemical analysis of soils, which is expressly provided for in the geological survey; and the forest trees, and insects, which will be naturally objects of inquiry to those employed in making the botanical and zoological survey of the State, as they are particularly instructed to direct their inquiries with a view to agricultural benefit. You will also find by the hundred and ninety-ninth chapter of the acts of the last Session of the Legislature, that provision is made by law, for obtaining statistical information in relation to certain branches of industry within the Commonwealth. It will appear from the provisions of the act referred to, that many of the subjects on which information is to be collected, fall within the range of an agricultural survey. The official returns under this act will be open to your examination; and, it is supposed, will relieve you from the necessity of instituting inquiry yourself, on some points to which you might otherwise feel it proper to give your attention.

It is supposed that a period of two years will be sufficient to enable you to accomplish the survey in a manner designed by the Legislature; and, in such a way, as to reflect credit on yourself, and be productive of great good to the community.

You will keep an account of your expenses, to be submitted with the proper vouchers to the Council, in order to the quarterly settlement of your accounts; and you will be pleased, at the close of each quarter, to make a summary report to the Executive, of the general progress of the survey.

Respectfully, your obedient servant,

(Signed) EDWARD EVERETT.

REV. H. COLMAN.

[B.]

CIRCULAR.

To the Farmers of Massachusetts on the subject of an Agricultural Survey of the State by the authority of the Legislature.

To

SIR:—Having been appointed by the Executive of the Commonwealth, under the provisions of a Resolve of the Legislature, passed at its last session, Commissioner to make an Agricultural Survey of the State, I take the liberty of addressing this Circular to several gentlemen of intelligence and respectability in the different towns, yourself among others, with a view to obtain their advice and co-operation in accomplishing such survey.

You will allow me, then, to point out the general objects of inquiry; and to solicit particularly your attention to them; that when I visit you, as I shall ask the pleasure of doing, you will be able to give me, in respect to those which have been the subjects either of your experience, inquiry, or observation, the desired information. By the Resolve it is made the duty of the Commissioner “To collect accurate information of the state and condition of the Agriculture of the Commonwealth, and every subject connected with it; point out the means of improvement; and make a detailed report thereof, with as much exactness as circumstances will admit.” From the terms of the Resolve it is apparent that the duty is very comprehensive; as it embraces every

subject connected with the agriculture of the State, and the means of its improvement. The more full however it is, the more useful it is likely to prove; and exactness in the information obtained is obviously of the very highest importance. I will now point out some of the objects to which inquiries will be directed.

I. *The Nature of the Soil, in different parts of the State; and particularly in reference to the crops cultivated.*

II. *The Climate, with reference to the crops grown; the usual time of ploughing, planting, and harvesting; the occurrence of early frosts; the length of winter; the average temperature; and the quantity of rain or snow in any year.*

It is desirable that meteorological observations should be made in different parts of the State.

III. *The Number of Acres in any town.*

1. cultivated or in any form productive.
2. in wood, timber, &c.
3. capable of cultivation but unproductive.
4. waste or irreclaimable.

IV. *Products.*

1. The amount raised in any town in any given year.
2. The average yield of any crop per acre.

V. *Crops cultivated; among which are the following:—*

Wheat.	Broom Corn.	Parsnips.	Lucerne.
Indian Corn.	Teasles.	Beets.	Tall Meadow-
Rye.	Madder.	Artichokes.	Oats.
Barley.	Woad.	Pumpkins.	English Bent.
Oats.	Saffron.	Squashes.	Rye Grass.
Buck Wheat.	Rape.	Turnips.	Millet.
Pease.	Mints.	Fruits.	Foul Meadow.
Beans.	Mustard.	Garden Vegeta-	Blue Grass.
Tares.	Succory.	bles.	Salt Marsh Grass-
Lupins.	—	—	es.
Hemp.	Potatoes.	Herds Grass.	Grass for Bonnets.
Flax.	Onions.	Clovers.	Mulberry for Silk.
Tobacco.	Cabbages.	Red top.	Sunflower for Oil.
Hops.	Carrots.	Orchard Grass.	Poppy for Opium.

VI. *Other Products.*

Wool.	Beef.	Mutton.	Cheese.
Silk.	Pork.	Lard.	Butter.

VII. *Rotation of crops.*VIII. *Modes of Cultivation.*

1. Soils adapted to particular crops.
2. Preparation of the soil by ploughing and manures.
3. Seeds; selection; change of seed; quantity; preparation; steeps for seeds; preservation of seed from worms, birds, and vermin.
4. Care and management of the growing crop.
5. Harvesting. Time and manner.
6. Use and application of the product.
7. Labor required; and general expenses of a crop.
8. Value of the crop for use or sale.
9. Marketing of the product.

IX. *Diseases of Crops. Blight; mildew; rust; curl; &c. &c.*X. *Weeds; and methods of extermination.*

Thistles; Canada thistles; brake; laurel; ox-eyed daisy or white weed; ranunculus or butter-cup; wood-wax; pine-weed; St. John's wort; charlock or cadluc, sorrel; cockle; tares; chess or cheat, &c.

XI. *Refuse of Crops. Preservation; value, and use for fodder or manure.*

1. Value and use of the stalks and husks of Indian Corn, and how preserved.
2. Value and use of the stalks and husks of Broom Corn.
3. " " of the straw of Wheat, Rye, Oats and Barley.
4. " " of the haulm of Pease and Buck Wheat.
5. " " of Potato tops, &c. &c.

It may be useful in this place to give an outline of the manner in which it may be desirable to conduct the inquiries. I will take, for examples, Wheat and Indian Corn.

Wheat.

1. History of its cultivation in the state.
2. Kinds; bearded or bald; flint or soft skin; red or white; summer or winter; where obtained; by what name or quality designated; average weight per bushel.
3. Amount of any particular crop; extent of land sown.
4. Condition of the land; nature of the soil; whether newly clear-

ed: burnt: swarded: or how used for two or three previous years; how prepared for sowing.

5. Kind and quantity of manure: use of lime; plaster; or any compost manure.

6. The quantity of seed to an acre, and preparation of the seed; advantages or evils of steeping the seed.

7. The time of sowing: week and day, if possible to be ascertained. The importance of such an inquiry as this will appear for the reasons which follow:

It is strongly recommended that wheat should be sown before the 14th of September, so as to be well rooted before winter: thus affording a better protection against frosts. Or else so late as not to germinate before spring: this method has been tried. Or frozen in water in the autumn and kept so until the spring, which experiment is reported to have been successful. It is often desirable for wheat to follow Indian corn; but Indian corn in general cannot be taken off in season to get the wheat sown. The discovery of any mode, such as the above for example, by which the necessity of this early sowing could be obviated, would be of great advantage.

Wheat sown early is more likely to have passed beyond injury from the hot, damp, steaming weather, which occurs in July and occasions rust. Query; whether late sown wheat is not likely to pass beyond that season before it gets into a condition to be injured, which is while it is in the milk.

Late sowing of wheat, as in some cases the last of May and the first of June, it is stated, has carried the season of flowering beyond the time of the wheat insect, and the crop has been saved.

8. The diseases or accidents, if any; whether affected by rust, smut, or mildew; and any circumstances of weather, situation, or particular condition of the plant connected or contemporaneous with such occurrence. The situation or exposure of any blighted field, whether high and airy, or low, damp, and confined.

9. Whether or not affected by the vicinity of barberry bushes.

10. Whether winter killed or not; under what circumstances as it regards the forwardness or lateness of the plant; and how affected by the snow.

11. Whether attacked by the Hessian fly or other insects; and preventives, if any.

Wheat is, in many parts of the country, subject to injury from an insect or worm, whose appearance is comparatively recent; and whose

habits are not well ascertained. He is making dreadful havoc in the wheat regions, producing in many cases, an entire destruction of extensive fields of the most promising appearance; and has advanced at the rate of about forty miles a year. The same insect, it is believed, though the identity is not perfectly ascertained, has attacked rye and oats with alarming success. The cultivation of wheat has on this account been abandoned in some parts of the state; and in what have heretofore been deemed some of the most productive wheat regions in New York.

Inquiries and experiments on this subject are of immense importance. A perfect preventive or security would be worth millions to the country.

12. Remedies or protection against blight or other accident.

13. The extirpation of weeds particularly injurious to the wheat crop, such as tares, cockle, chess, garlic, and the Canada thistle; and any machinery by which the grain may be cleansed of "foul stuff."

14. The experience of farmers in the cultivation of wheat crops successively on the same land; and in sowing clover with the wheat with a view to ploughing it in as manure for a succeeding crop; and whether customarily ploughed in with the stubble; or depastured; or mowed for one or more years.

15. The general subject of sowing grass with grain; and the value in such case of a stubble crop for winter fodder.

16. Harvesting.

Time and state of cutting; and whether early or late cutting be preferable; the time, in the opinion of some persons, making a material difference in the amount and value of the crop.

Modes of harvesting; reaping or cradling; and cost by day or piece work; average amount of a day's work.

17. Threshing and Cleaning.

Threshing machines. Winnowing machines.

18 Manufacture of Flour. Various qualities. Number of bushels required for a barrel. Miller's charges and profits.

19. Construction of mills and flouring machinery. Water, steam, and wind power. Domestic mills.

20. Value and uses of bran.

21. Value and uses of wheat straw.

22. Value of a wheat crop compared with other crops. Average yield.

23. Capacity of the state to furnish its own wheaten bread
24. Experiments and observations in regard to this crop. Causes of its general failure.
25. Some general estimate of the quantity and cost of imported flour consumed in any village, town, or county.

Indian Corn.

1. Kinds. Gourd seed. White soft corn. Sweet corn. Flint corn.
2. Varieties of flint corn. White; yellow. Weight per bushel. Comparative amount of cob and grain in different varieties.
3. Soils most suitable. Preparation of land. Crop, if any, which it may best succeed. Fall or spring ploughing. How often may it be repeated on the same land.
4. Manuring; kinds of manure most suitable; quantity to the acre; how distributed—in hills, drills, or spread—applied green or rotted. Lime; its value to corn—how applied. Gypsum; its value to corn—how applied. Ashes; its value to corn—how applied; crude or spent.
5. Seed—how selected; effects of selection in increasing the crop; how saved; steeped or sowed dry; various steepings; copperas water; lye; rolling in tar; coating with gypsum or ashes; quantity of seed.
6. Time of planting; modes of planting—in hills or drills, distance of plants; protection against vermin or birds.
7. Cultivation. Weeding; ploughing or harrowing among corn; use of a cultivator; number of hoeings; hilling or earthing up. Topping; suckering; stripping; with the effects upon the crop.
8. Value of the corn stalks and leaves when taken green; and mode of curing.
9. Alternate rows of corn and potatoes. Planting pumpkins or turnips among corn. Sowing grain among corn for a succeeding crop.
10. Harvesting. Gathering by the ear; or cutting up and stacking in the field.
11. Preservation of the grain. Construction of granaries.
12. Preservation and comparative value of the stover or dried fodder.
13. Machines for shelling.
14. Average yield per acre; value of the crop; cost of cultivation from beginning to readiness for the mill. Kiln-drying.

15. Value and uses of Indian Corn—for dairy animals.

"	"	"	for fattening stock.
"	"	"	for swine.
"	"	"	for horses.
"	"	"	for distillation.
"	"	"	for extraction of oil.

Having thus given a sketch of the manner in which it is proposed to conduct the inquiries on particular subjects, in respect to which it would confer an obligation on me to have your suggestions, or those of any experienced farmer, I proceed to other great topics, to be embraced by the survey.

XII. *Manures.*

1. Animal manures.

Animal excrements; varieties; comparative value; preparations; uses.

Decayed bodies. Refuse of slaughter houses.

Bone; horn; hair; feathers; wool.

Fish. Fish oil. Gurry and blubber. Soap-suds.

2. Mineral manures.

Line in various forms and compounds

Salt. Marine Shells. Gypsum. Clay. Sand. Marl.

Dock-mud. Ashes of mineral coal. Burnt clay.

3. Vegetable Manures.

Ashes of wood and peat. Soot. Tanner's waste. Straw.

Leaves. Sea weeds. Rape dust. Street manure.

Green dressings ploughed in. Buck-wheat. Clover.

4. Artificial manures. Composts.

5. Modes of applying manure.

Mixed or clear; solid or liquid; in drill or broadcast; in fresh or fermented and decayed state;—at what season of the year or crop;—annually, or how often; in what quantity.

Use and application to permanent pastures and mowing lands.

6. Manure houses or cellars; Vaults for the preservation of urine; and provisions for forming compost manures.

Machines for the application of liquid manures.

XIII. *Live Stock.*

1. Black Cattle. Horses. Sheep Swine. Poultry.

2. Comparative value of different breeds of animals for stall, work, and dairy; and notices of herds or individuals of improved breeds, with places where found.

3. Animals known among us. Native; Hereford; Black Spanish; Devon; Holderness; Yorkshire; Alderney; Ayrshire.

Improved Durham Short Horns.

4. The subject of breeding.

XIV. *Animals for Labor.*

Horses and Oxen. Comparative value. Mules. Cost of keep; harness; shoeing; deterioration or improvement.

XV. *Animals for Beef.*

1. Sex most eligible.

2. How reared; as calves, how fed; how long with the cow: how managed the first winter.

3. What age at maturity. Age best for fattening.

4. If pastured—average number of acres to an animal.

5. If soiled; how managed and fed.

6. If stalled on dry feed, how fed: how long kept: amount of hay consumed per day: of meal: of vegetables: kinds of meal: kinds of vegetables; how prepared; meal ground with or without cob; mixed or unmixed; wet or dry; cooked or raw.

7. Use of flaxseed; oil; and oil cake in fattening.

8. Gain per day; per month.

9. Machines for cutting and steaming food.

XVI. *Market; Returns of Brighton and Danvers markets.*

1. Animals—how sold—on the hoof: or by weight after slaughter. If by weight, how determined: customs of butchers; what parts weighed; what considered as perquisites of butchers. Liabilities to error or fraud, if any; customs in other markets.

2. Different parts—how disposed of; relative value.

3. Modes of curing, packing, inspecting beef, pork, hams, &c. &c.

4. Drift of animals; customs of Drovers; expenses; loss in weight by travelling.

XVII. *Animals for the Dairy.*

1. Choice of breeds. Examples and history of cows of extraordinary product.

2. Size and color as affecting produce. Continuance in milking.

Effects of early coming in. Disposition of the calf. Times of milking.

3. Average yield of a good cow in milk; in butter; in cheese.

4. Trials of milk as to quantity of cream; of butter; and of cheese, per gallon.

5. Modes of feeding; vegetables; grain or meal, how given or prepared; quantity.

XVIII. *Dairy Produce.*

1. Butter; modes of making and preserving.

2. Cheese; modes of making and preserving.

3. Comparative profits of making butter and cheese.

4. Use of skim-milk, butter-milk, and whey.

5. Advantages, if any, of giving it to the cow.

6. Value of dairy refuse for swine.

7. What proportion between number of cows kept, and number of swine kept.

8. Steaming; heating; freezing milk; with comparative advantages of each method for raising cream.

9. Effects of different kinds of salt upon butter. Use of sugar and saltpetre for butter. Coloring matter for cheese.

10. Protection from vermin

11. Grasses for dairy purposes.

12. Churns; presses; spring-houses; pans.

XIX. *Swine.*

1. Breeds. Maturity, and age for fattening. Average weight when fattened.

2. Mode of raising; in sty or at large; pasturage or soiling on clover.

3. Fattening; value of vegetables; value of meal; preparation of food; raw; steamed; boiled; fermented. Gain per day, per month. Season best for fattening. Time of killing.

4. Assortment of parts; packing of pork; curing of hams; making of sausages, &c. &c.

5. Trial of different kinds of food. Corn; rye; barley; oats; broom corn; pease; apples; potatoes, &c. &c.

XX. *Sheep.*

1. Breeds; crosses.

2. Yield in wool. Time of shearing. Mode of washing and cleansing. Mode of doing up the fleece.

3. Yield in mutton. Age for fattening; mode of fattening. Com-

parative value of different kinds of feed. Vegetables; corn; oats; oil-cake, &c. &c.

4. General management. Choice of Buck. Time of lambing. Mode of winter keeping.

5. History of particular flocks.

6. Sheep houses. Sheep racks.

XXI. *Horses. Mules.*

How raised; how kept; shoeing; general management; comparative value for labor.

XXII. *Animals kept for breeding.*

Bull. Stallion. Ram. Boar.

Valuable points; defects; general management.

XXIII. *Feeding of Animals.*

1. Pasturage. Winter keeping.

2. Soiling of Animals; articles to be cultivated for this purpose.

3. Cutting feed. Steaming or cooking. Green vegetable feed; Dry feed.

XXIV. *Poultry.*

Kinds; management; comparative value.

XXV. *Diseases of Domestic animals.*

Of horses; cattle; sheep; swine; poultry; and remedies.

XXVI. *Farm Buildings.*

1. Barns. Stables. Styes. Poultry-houses.

2. Modes of fastening and harnessing cattle. Stalls; mangers; stanchions; ropes; chains; bows.

3. Yokes and harnesses.

4. Dwelling Houses, with comparative cost of stone, brick, and wood. Improvements in apparatus for cooking; and for warming houses.

XXVII. *Bees.*

Cultivation of feed for bees. Construction of hives. Protection against the bee moth.

XXVIII. *Orchards. Gardens.*

1. Varieties of fruits, with methods of propagation and selection.

2. Varieties of esculent vegetables, with methods of cultivation.

XXIX. *Diseases of Trees and Plants.*

XXX. *Injurious Insects and Vermin.*

Borer. Canker worms. Caterpillars. Potato worms. Tobacco

worm. Slugs. Bee moth. Turnip fly. Crows and Black-birds. Woodchucks. Foxes. Field mice. Rats.

XXXI. *Fences.*

Stone walls. Rail fences. Live hedges. Hedge and ditch. Raised banks, &c.

XXXII. *Forest Trees.*

1. For timber. For fuel.
2. Modes of raising. Care of forests. Time and modes of cutting.
3. Nurseries of fruit and forest trees.
4. Plants for hedges and fences.

XXXIII. *General Improvements.*

Clearing wild land.
 Removing stumps and stones.
 Draining.
 Irrigation.
 Paring and burning.
 Gravelling low meadows.
 Improving Peat meadows.

XXXIV. *Great Farming Operations.*

1. Ploughing.
2. Sowing; planting; laying down to grass.
3. Haymaking.
4. Harvesting.
5. Preserving and expending the produce.
6. Marketing.

XXXV. *Examples in detail and in full of*

1. General farm management.
2. Particular crops.
3. Particular Improvements.

XXXVI. *Labor.*

1. Farm labor by the month or year.
2. " by the piece.
3. Cost of board and prices of provisions.
4. Use of spirituous liquor.
5. Laws and customs relating to labor.

Mechanical Labor.

1. Blacksmith. Price per pound of iron.
- " Price of Horse shoeing. Ox shoeing.

2. Carpenters' work per day.
3. Masons' work, per day.
5. Wheelwrights' work, per piece.
5. General cost of farming utensils : carriages, and equipments.

XXXVII. *Farming Implements, &c.*

Ploughs. Harrows. Horse Rakes. Cultivators and Horse Hoes. Threshing Machines. Winnowing Machines. Vegetable Slicers. Hay Cutters. Rollers. Drill Machines. Corn Planters. Corn Shellers. Wheel Carriages. Stump Extractors, &c. &c.

XXXVIII. *Condition of Roads and Improvements in construction of Roads, as intimately connected with the agricultural prosperity of a country.*

XXXIX. *Miscellaneous Subjects.*

1. Size of farms.
2. Farm capital.
3. Farm accounts.
4. Laws relating to agriculture.
5. Taxes and burdens upon land.
6. Agricultural pauper establishments.
7. Agricultural and manual labor schools and colleges.
8. Agricultural Societies. Funds. Premiums. Operations. Cattle Shows.
9. Agricultural Libraries and Publications.

XL. *Manufactures connected with Agriculture.*

1. Household Manufactures of wool, silk, flax, hemp, hair, bristles, straw, &c. &c.
 2. Leather, with all its various preparations.
 3. Glue. Combs. Buttons. Bonnets and Hats from grass, straw, or wool. Wooden Ware. Barrels.
- Maple Sugar. Maple Molasses. Beet Sugar. Potato Syrup. Starch. Opium. Sunflower Oil. Indian Corn Oil. Linseed Oil. Neat's foot Oil. Wine from Grapes. Wine from Currants.
- Cider. Perry. Beer and Ale. Whiskey. Gin.
- Soap. Candles.

XLI. *Objects of particular inquiry, with a view to agricultural improvements.*

1. Improvements in live stock.
2. " in utensils and farm buildings.
3. " in new vegetables, fruits, and grasses.

4. Improvements in seeds for earliness and abundant yield.
5. “ in economical preparations and uses of food for man and beast.
6. “ in economical uses of fuel.
7. “ in economical application of human and brute labor.
8. “ in application of water, steam, or wind power to purposes of husbandry.
9. “ in cultivation — depth of ploughing; mixing of soils; compost manures: manuring with green crops; inverting and covering the sward; drill culture; sowing broad-cast; management of any particular crop, &c. &c.
10. Improvements in rotation of crops.
11. “ in uses of lime; gypsum; bone-dust.
12. “ in application of ashes; crude or spent.
13. “ in application or discovery of other manures.
14. “ in construction of farm buildings.

XLII. *Exports and Imports of agricultural produce.*

Capacity of the State to supply its own wants. General views.

XLIII. *Specimens of Soil to be analyzed.*

Models of improved implements.

Models of improved buildings.

Sketches of improved modes of draining lands.

Collection of valuable seeds or plants.

Samples of wool, silk, and sugar.

I have thus, sir, laid before you the principal objects designed to be embraced in an Agricultural Survey of the State. It is not of course expected that every farmer, possibly not any single farmer, will be able to give me information on every subject here enumerated; nor will any farm or any town in the Commonwealth furnish examples of all the various crops, operations, and stocks here mentioned. But what is wanting in one may doubtless be found in another: and as no subject is mentioned in which the agriculture of the State is not directly concerned, it is hoped that much valuable and practical information may be collected in regard to all. It will be my province to gather up the fragments that nothing be lost. I earnestly solicit, therefore, your particular aid in acquiring this information; and the communication of your knowledge or experience, either by writing, conversation, advice, or in any form in which you will please to give it. Any trouble which any gentleman may take upon himself for the purpose of procuring information shall be always gratefully acknowledged.

My duty will require me to visit every town in the state; and my wish is to visit every principal farm in every town, the management of which promises to afford useful information. In determining what particular farms to visit, it is obvious that I must necessarily be directed by the advice or suggestions of others, which I shall always be most happy to receive; but, in order to avoid all invidiousness, I beg leave to state distinctly, in the outset, that, unless prevented by extraordinary circumstances, I will visit every farmer, who will do me the kindness to invite me to his premises; and I have perfect confidence in finding oftentimes as creditable and instructive management among small farmers as among those, who pursue agriculture upon an extensive scale. I therefore solicit such invitations: and will gladly avail myself of them.

I purpose to make the survey by counties, and am anxious to prosecute it with all convenient despatch. I beg the farmers to whom this circular is sent, to give it an attentive and repeated examination. The objects of the survey are most important to the farming interest. I go to seek information from practical men: and shall be happy to communicate all that I receive. I solicit the correspondence and co-operation of such men. It is reasonable to hope that the inquiries will elicit much valuable knowledge; that they will contribute to excite and strengthen a spirit of improvement in agriculture, this most honorable and useful pursuit; that they will unfold agricultural resources and capacities of which we were not fully aware; that they will strengthen those, which already exist, and present new reasons for a devoted attachment to our native state: a state, which, if its soil be comparatively hard and sterile and its climate severe, is in a high degree favorable to longevity, to strength of muscle, vigor of intellect, and moral energy: furnishes an ample reward to patient industry, temperance and frugality: and, under the administration of upright magistrates, and wholesome and equal laws, which she has so long and eminently enjoyed, abounds in the elements of domestic comfort, and social improvement and prosperity.

Yours respectfully,

HENRY COLMAN.

Boston, June, 1837.

P. S. Communications and letters relating to the Survey may be addressed to the subscriber at Boston. They may be forwarded by private conveyance to the post-office in Boston, or directly by mail, if otherwise not convenient.

[C.]

FARM REPORT.

REPORT of the Farm of

in

18 .

Extent.	No. of Acres.	Soil.	Write Yes or No.	Live Stock.	No.
Tillage, . . .		Loamy ? .		Horses, . . .	
Eng. Mowing,		Clayey ? .		Oxen, . . .	
Salt Marsh, .		Sandy ? .		Cows, . . .	
Wet Meadow,		Gravelly ? .		Sheep, . . .	
Pasture, . . .		Lime ? . .		Swine, . . .	
Orcharding, .		Wet ? . .		Colts, . . .	
Wood, . . .		Dry ? . .		Young Neat } Stock, }	
Waste, . . .		Hilly ? . .			
		Level ? . .			
Total, . . .					

Price of Labor.

Man's labor, (board included, per year, \$
Per month, . . .
Per day, . . .

*Amount of Sales in 18 .**Value of Produce used or on hand.**Cost of Labor.**Price of Man's Board.*

Per week, . . . \$

Incidental Expenses.

Crops and Products.	Am't of Produce in 18	Average yield per acre.	Crops and Products.	Am't of Produce in 18	Average yield per acre.
English Hay, . Tons.			Onions, . Bushels.		
Salt do. . . "			Carrots, . . "		
Fresh Meadow do. "			Beets, . . . "		
Millet, . . . "			Parsnips, . . "		
Wheat, . . Bushels.			English Turnips, "		
Indian Corn, . . "			Ruta Baga, . . "		
Rye, ... "			Pumpkins, . Tons.		
Barley, ... "			Squashes, . lbs.		
Oats, ... "			Broom Corn, . . "		
Buckwheat, . . . "			Flax, ... "		
Pease, ... "			Tobacco, . . . "		
Beans, ... "			Hops, ... "		
Potatoes, . . . "			Teasles, pr. thousand,		

Other Products in 18 .	Amount.	Other Products in 18	Amount.
Beef, . . . lbs.		Straw, . . . Tons.	
Pork, . . . "		Corn Fodder, . . "	
Butter, . . . "			
New Milk Cheese, . . "		Wood used, . . Cords.	
Wool, . . . "		Wood sold, . . "	
Silk, . . . "		Peat, . . . "	
Honey, . . . "		Charcoal sold, . . Bushels.	
Beet Sugar, . . . "			
Maple Sugar, . . . "		Manure made, . . Cords.	
Cider, . . . Barrels.		Manure bought, . . "	
Winter Apples, . . . "			
18		<i>Average yield of a Cow per annum.</i>	
Lambs sold, . . No.		Of milk, . . . gallons.	
average price,		Of butter, . . pounds.	
Pigs sold, . . No.		New milk cheese, "	
average price,			
Calves sold, . . No.		<i>Average weight of a Hog fatted at 18 months old.</i>	
average price,		lbs.	
Young stock, . . No.			
Average price of yearlings, . . .		<i>Average yield of Wool to a sheep per year.</i>	
Two years old, . .		Native, . . . lbs.	
Three years old,		Merino, . . . "	
		Saxony, . . . "	
<i>Average number of Lambs raised yearly to 50 ewes.</i>		Saxon-Merino, . . "	
Native, . . . No.		Dishley, . . . "	
Merino, . . . "		Leicester, . . . "	
Saxony, . . . "		South-down, . . "	
Various, . . . "		Mixed, . . . "	
<i>Animals fatted in 18</i>			
Beef Animals, No.		<i>Manures used ; and number of loads or bushels to the acre.</i>	
On what ?			
Swine, . . . No.			
On what ?			
Sheep, . . . No.			
On what ?			

SIR:—Please fill the blanks with as much exactness as you can, and favor me with your suggestions and remarks on such topics as you may deem useful; for example;

1. What improvement have you made in building; in cultivation; in draining; in irrigation; in clearing land; in live stock; in feeding animals; in forwarding seeds; in raising forest trees; or in any other matter?
2. What breed of cattle do you raise? What breed do you prefer for labor, stall, or dairy?
3. What experiments have you made in the application of manures? What are the effects on your farm of Lime, or Gypsum; and how used?
4. What large or extraordinary crops of any kind have you raised; and how cultivated?
5. What remarkable beef cattle or milch cows have you owned; or known in your neighborhood? Please to give an account of them.
6. What agricultural experiments of any kind have you made, the knowledge of which, whether successful or unsuccessful, would be useful?
7. What do you deem the most profitable articles of cultivation?
8. What is the general disposition of the products of your farm?

Be kind enough to let me hear from you; and when this table is filled out at the close of the season, please enclose it with your remarks, which I hope for at large, and forward it to my address *by private conveyance*, to the office of the Secretary of State, Boston.

HENRY COLMAN,
Commissioner for Agricultural Survey.

JULY, 1837.

[D.]

Extract of a letter to the Commissioner of Agricultural Survey from Henry W. Bishop, Esq., Lenox, late President of the Berkshire Agricultural Society, Jan. 1, 1838.

“It has been very difficult to induce the farmers to make the desired returns. Very few are able to do so except as to some particular crops, which they consider of little moment. It will be different, I think, the next season. The importance, as a matter of profit and loss, of a more precise knowledge of the expenses and proceeds of the several branches of their occupation, is seen and felt. Your visit here has done much good. A spirit of inquiry has been awakened, and will keep awake, till many useful things are learned. Results, hereafter, will be oftener ascertained by measure and figures. Less will be left to loose, careless estimation.”

Extract from a letter from an eminent farmer in Pittsfield, Berkshire County, Sam'l D. Colt, Esq., dated 16 Feb, 1838.

“Your visit to our county will be of incalculable benefit to the agricultural interest. The encouragement with useful hints, with your judicious advice thrown out from time to time in the hearing of our agriculturists, will be stored up by our young farmers, who will practise upon them: and should you visit us next June, when our crops are growing, presuming you have not closed your survey of the county, I doubt not you will see some good effects, resulting from your labors of last autumn.”

I hope I may be pardoned for citing these testimonials, which I do most certainly not for any personal considerations, but simply to show the encouragement, which the survey has met with in one of the most agricultural sections of the state, yielding to none other in intelligence and general improvement.

[E.]

On Cultivation of Rye.—JOHN KEELY'S STATEMENT.

TO THE TRUSTEES OF THE ESSEX AGRICULTURAL SOCIETY :

GENTLEMEN,—Having for some years past been more than commonly successful in raising large crops of winter rye by a process of cultivation which I believe is entirely new; I have been induced by the suggestion of some gentlemen whose judgment I very much respect, to submit for your consideration a statement of the mode of culture with the produce. And that the success of the experiment this season, may not appear to be altogether accidental, it will perhaps be as well to communicate the result of the process for the three or four previous years.

The land on which the experiment has been conducted is situated on the Merrimack, about a mile and a half east of Haverhill bridge; and came into possession of my father in 1827. The soil is a sand, approaching to loam as it recedes from the river. Perhaps the term *plain land* (by which it usually passes) will better convey an idea of the quality of the soil. It is altogether too light for grass. The crops we find most profitable to cultivate on it are winter rye, Indian corn, potatoes, and to some extent turnips. Oats might probably be raised to advantage were it not that the land is completely filled with the weed commonly called charlock, which renders it entirely unfit for any spring crop, excepting such as can be hoed. The crops of rye, on the neighboring soil of the same nature, vary I believe from seven or eight, to twelve or thirteen bushels per acre, according to the cultivation and their approximation to the river. We usually raise on the land from thirteen to thirty bushels of Indian corn per acre. Potatoes are very good in quality, but the quantity is quite small: not sufficient to be profitable were it not that the land is very easily cultivated.

In the summer of 1827, we sowed three bushels of winter rye near the river, on about two acres of land, which produced twenty eight bushels.

In 1828, we sowed four bushels on four acres of land running the whole extent of the plain from the river. This piece was sowed in the spring with oats; but they were completely smothered with charlock, and about the middle of June, the whole crop was mowed to prevent the charlock seeding. By about the middle of August, a

second crop of charlock having covered the land, it was ploughed very carefully, in order completely to bury the charlock; and then suffered to remain until the 15th of September when we began sowing the rye in the following manner. A strip of land about twelve yards wide was ploughed very evenly to prevent deep gutters between the furrows, and the seed immediately sown upon the furrow and harrowed in. Then another strip of the same width, and so on until the whole was finished. We found the oat stubble and charlock entirely rotted, and the land appeared as if it had been well manured, though none had been applied to this part, since it had been in our possession. The rye sprung very quick and vigorously, having evidently derived great benefit from being sown and sprouted before the moisture supplied by the decaying vegetable matter in the soil had evaporated to any considerable extent. This crop produced 133 bushels.

In 1829, the charlock was suffered to grow on the land appropriated to rye, until it had attained its growth and was in full blossom. The land was then ploughed very carefully and the charlock completely covered in. In a short time a second crop appeared more vigorous than the first. This also was allowed to attain its growth, and then ploughed in as before. A third crop soon appeared, which of course was destroyed when the land was again ploughed for sowing about the middle of September. This piece of land was a parallel strip running from the river, and containing two acres. Two bushels of rye were sowed. The crop presented a remarkably promising appearance, and yielded seventy four and a half bushels.

In 1830, the land appropriated to rye included nearly all the lighter parts of the soil, and owing to a pressure of business was not attended to as we could have wished. It was ploughed in the early part of the summer. But harrowing to destroy the weeds was substituted for the second ploughing. This, and the unusual blight which affected all the grain in this part of the country, led us to anticipate a small crop. It yielded however fifteen bushels to the acre.

The land on which the crop of rye was raised the present season, had for the three or four previous years been planted with Indian corn. And owing to the extent of our tillage land, we have not been able to apply more than four or five loads of manure to the acre this season. The charlock was suffered to attain its growth as usual; and on the 18th and 19th of June it was carefully ploughed in. The second crop was ploughed in on the 6th and 7th of August. On the 14th and 15th of September it was sowed in the usual manner, namely: a small

strip of land was ploughed and the seed sown immediately upon the furrow and then harrowed in. Then another strip of land was ploughed, and so on until the whole was completed. One bushel per acre was sowed as usual. The seed was originally obtained from a farmer in this vicinity, and I suppose is similar to that which is generally used. We have never prepared our seed in any manner, but have directed our attention solely to the preparation of the land; and to this we attribute our success. Owing to the unusual severity of the winter, the crop was considerably winter killed; but recovered very soon in the spring, excepting in the midfurrows. There, as the land lies very level, the water settled and so completely destroyed the rye that they continued bare the whole season. This would of course cause some diminution in the crop; perhaps a bushel or two. The rye was reaped at the usual season, and, as the weather was favorable, immediately put into the barn. The land contained one acre and thirteen rods and yielded *forty six bushels and three pecks. A remarkably fine sample.*

In entering a claim for your premium, I would ask your attention particularly to the process of cultivation. It is, I believe, entirely new; and capable of general application.

Sowing the seed immediately after the plough we consider very advantageous to the crop. The soil being then moist, causes the seed to spring immediately, and gives a forwardness and vigor to the plants which they ever after retain.

The process of ploughing in *three* crops of weeds before the seed is sown very much enriches the soil. It would be altogether unnecessary to attempt to refute the notion, that by such a process nothing more is applied to the soil, than was before derived from it. If one could not discover by the light which Chemistry has shed upon the subject of agriculture, sufficient *reasons* for the contrary conclusion, observation, one would think, would be sufficient to convince any intelligent man of the fact.

And here I would suggest that I do not consider the experiment as we have conducted it, quite complete. To render it more so, in the first place, in ploughing in the weeds, I would not turn a furrow after the dew had evaporated. I have no doubt but that a large portion of that fertilizing quality in the soil, which (during the summer months) is continually exhaled from the earth, is by the dew brought again within our reach, and it would be wise to avail ourselves of the opportunity of again burying it in the soil. And in the second place, I would by

all means use a heavy roller after each ploughing. It would fill all the cavities left by the plough, and by pressing the soil more closely to the weeds, at once hasten their decomposition and very much retard the evaporation from the soil.

But the land is not only very much enriched by this process. There is, I conceive, no method by which it can be so effectually cleaned. Three times during the season, a fresh surface is presented to the atmosphere, and each time, as the decaying vegetable matter increases in the soil, so is the exciting cause augmented to make a more vigorous effort. We have in this manner gone over nearly all our land which is infested with charlock, and the diminution of the weeds is quite sufficient to warrant the expectation, that in a few years it may be comparatively eradicated.

Very respectfully,

JOHN KEELY.

HAVERHILL, Sept. 22, 1832.

[F.]

CULTIVATION OF THE LARCH.

The Larch referred to in the text and there called the German Larch, is the common or White Larch, (*Larix Communis*,) and resembles our Hackmetack or Black Larch, (*Larix Pendula*,) in the value of its timber and bark. "The American Larch or Hackmetack is a magnificent vegetable with a straight slender trunk, eighty or a hundred feet in height, and two or three feet in diameter. The wood of the American Larch is superior to any species of pine or spruce: it is exceedingly strong and singularly durable. In Canada it is considered as the most valuable timber. In the State of Maine it is esteemed more than other species of resinous wood for the knees of vessels." Its rareness however prevents its frequent use.

Some specimens of the common or White Larch, originally imported from Scotland, are to be found on the farm of the late Col. Timothy Pickering in Wenham in this county by the road side: to him they were sent as a present. The cultivation of this tree in Scotland for timber and fuel by a public spirited nobleman, the Duke of Athol, has

been so extraordinary both for utility and profit, that I think I shall confer a benefit on our farmers by giving a particular account of it. There are parts of Essex in which plantations of this tree might be made to great advantage. Fuel, fencing stuff, and building timber are matters of great importance: and ship timber, in this commercial and fishing county, will be always in quick demand. The Essex Agricultural Society, has offered liberal premiums for encouraging the cultivation of forest trees: so likewise has the Massachusetts Agricultural Society. These considerations will, I trust, justify my going so much at large into this important subject.

The timber of the White Larch has been as much extolled as that of the cedar, and with much more reason. The red Larch trees (*Larix microcarpa*) on the Athol estate do not contain one third as many cubic feet of timber as the White Larch of the same age. The rapidity of the growth of the White Larch is not less remarkable than the durability of its timber. Both have been experimentally tried in the Highlands of Scotland. It is stated by the Duke of Athol, "that on mountainous tracks there at the elevation of 1500 and 1600 feet, the larch at eighty years of age has arrived at an age to produce six loads (300 cubic feet) of timber, appearing in durability and every other quality to be likely to answer every purpose both of civil and naval architecture. It bears the ascendancy over the Scotch Pine in the following important circumstances. It will arrive at a useful timber size in one half or a third part of the time in general, which the pine requires; and the timber of the larch at thirty or forty years old, when it has been planted in a soil and climate adapted to the production of perfect timber, is in every respect, superior in quality to that of the pine at 100 years old. The bark of the larch is more than half as valuable as that of the oak in tanning."

"The late Duke of Athol planted 15,573 acres, which contained 27,431,600 plants. Of these 8,604,542 plants were larch. The larch in comparison with the Scotch Pine, is found to contain three and three quarter times more timber, and that timber of seven times more value. The larch also being a deciduous tree instead of injuring the pasture under it, improves it. The late Duke John, the Second, planted in the last years of his life, 6500 Scotch acres of mountain ground solely with the larch, which, in the course of seventy-two years from the time of planting, will be a forest of timber fit for building ships of the largest class in the navy. It will have been thinned out to about 400 trees

per acre. Each tree will contain at least 50 cubic feet, or one load of timber, which, at the low price of 1s. per cubic foot, only one half its present value, will give £1000 per acre, or, in all, a sum of £6,500,000 sterling. Besides this there will have been a return of £7 per acre from the thinnings after deducting all expense of thinning, and the original outlay of planting. Further still, the land on which the larch is planted is not worth above 9d. to 1s. per acre rent. After the thinnings of the first thirty years, the larch will make it worth at least 10s. per acre, by the improvement of the pasturage, upon which cattle can be kept summer and winter. (Highland Soc. Trans., Vol. 3, p. 168.

Soil for the Larch. It is an error to suppose that the larch will thrive in all soils and situations. There are many soils in which it will not thrive and ought not to be planted. In soils which have been turned up by the plough, and which have borne white crops, the larch cankers; in wet situations also. In soils resting on a wet tilly subsoil, it decays at the heart, after arriving at forty years of age. In situations where water stands for a length of time about the roots, it becomes fogged or covered with lichens. But in all rocky situations and particularly those which are composed of mica slate, containing crystals of garnets, among the fissures and fragments of which the trees can push down their roots, larches thrive to admiration.

The growth of the Larch. Taking the average height of an average larch, of eight years from the seed, at eleven feet, it will be nearly accurate to allow sixteen inches as the annual growth, till the tree is fifty years old, and after that, only ten inches per annum for twenty-two years longer, as the length of the tree lessens in growth as the bulk of the wood increases. These data give a larch tree of seventy-two years of age a height of ninety-three feet four inches; a fair average, agreeing with actual experiment.

In regard to the growth of the girth, a larch tree, on an average, will acquire an inch in girth per annum, till it be twenty-four years old; and from that time till it has acquired the venerable age of seventy-two years, it will grow one inch and a quarter in girth every year; thus:—

In 24 years, it will be 2 feet in girth, at 1 inch per annum.

48 years more, 5 feet in girth, at 1 1-4 inch per annum.

— —

In 72 years, it will be 7 feet.

The larch begins to make wood at twenty-four years of age.

At 50 years old it will contain 26 cubic feet of wood.

60	"	"	14 do. more.
72	"	"	20 do. more.

—

In all, 60 do., or one load of 50 cubic feet, and 10 feet more.

These results correspond exactly with the quantities which the Duke obtained at these respective ages. Larch appears to be on its greatest increase for timber from fifty-seven to seventy-two years old. A larch containing fifty cubic feet, or one load of timber, is quite fit for naval purposes. At half that size it is suitable for every country purpose.

With regard to other trees effecting a change of the ground, the following are the results of many experiments made by the Duke on the subject. In oak copses the value of the pasture is only 5s. or 6s. per acre for eight years only in every twenty-four years, when the copse is cut down again. Under a Scotch fir plantation, the grass is not worth 6d. more per acre than it was before it was planted. Under beech and spruce it is worth less than it was before; but the spruce affords excellent shelter to cattle, either from the heat of summer or the cold of winter. Under ash the value may be 2s. or 3s. per acre more than it was in its natural state. But under larch, where the ground was not worth 1s. per acre, the pasture is worth from 8s. to 10s. per acre after the first thirty years, when all the thinnings have been completed, and the trees left for naval purposes, at the rate of about 400 to the acre, and twelve feet apart. Nay, so impressed was the Duke of the value of larch, as an improver of natural pasturage, that he makes a statement to show that the pasture alone, independent of the ship timber on it, would increase the value of land by increasing its annual rental, so that it itself would repay the whole outlay of fencing and planting, at five per cent. compound interest.

The value of larch wood, exclusive of the value of the pasture under it, may be estimated in this manner:—suppose the plantations are thinned out by thirty years to what they are to stand for ship timber; that is to 400 trees per Scotch acre;—suppose after that period the whole were cut down at the following respective ages: the value of the whole per acre at the different periods, would be as follows:—

400 trees at 30 years old, at 2 1-2 cubic feet each tree = 1000 cubic feet. or twenty loads at 1s. 6d. per foot profit = £75 per acre.

400 trees at 43 1-2 years old, at 15 cubic feet each tree = 6000 cubic feet, or 120 loads, at 1s. 6d. per foot profit = £450 per acre.

400 trees at 59 years old, at 40 cubic feet each tree = 16,000 cubic feet, or 320 loads, at 2s. 6d. per foot profit = £2000 per acre.

400 trees at 72 years old, at 60 cubic feet each tree = 24,000 cubic feet, or 480 loads, at 2s. 6d. per foot profit = £3000 per acre.

The average of these prices would be £1381 5s. per acre, so that £1000 per acre is not too high a calculation of the value of the Duke's larch plantations." These estimates are made upon foreign prices of timber; the profits among us of a plantation upon an humble scale would bear a fair proportion, as the product is always sure to command a market.

" Posts and rails for fencing may be made either out of the tops or the trunks of the young trees. While fir posts and rails last only about five years and are worm-eaten after that period, the larch posts stand for twenty years and never get worm-eaten.

The Riga timber and American white pine are about one fifth part less strong than the larch.

The relative duration of timber has been thus determined by M. Hartig, an eminent German professor of forestry. Small posts of lime tree, black American birch, alder, and trembling poplar, inserted in the soil, decayed in three years; the common willow, the horse chestnut and the platanus in four years; the purple beech and the common birch in five years; the elm, the hornbeam, the ash, and the Lombardy poplar in seven years; the acacia, the oak, the Scotch pine, the Weymouth pine and the spruce fir, at the end of seven years were only decayed a little to the depth of a quarter of an inch; the larch, the common juniper, the Virginia juniper, and the arbor vitæ were, at the end of the same period, untouched by decay. Thin boards of the same woods decayed in the following order: platanus, horse chestnut, lime tree, poplar, birch, purple beech, hornbeam, alder, ash, the maple, the spruce fir, the Scotch pine, the elm, the Weymouth pine, the acacia, the oak, and the larch. (*L'Agronome*, tom. i. p. 315.) It thus appears, that the larch, whether as posts with the bark on, or sawn up into boards, is by far the most durable of our timber trees."

[G.]

STONE BUILDINGS.

Extract from a letter to Commissioner of Agricultural Survey.

“ TOPSFIELD, Jan. 1, 1838.

“ In answer to yours of the 29th December: the stone house is 40 feet long and 34 wide; a cellar under the whole; the cellar wall laid in mortar about 3 1-2 feet thick; the first stone laid in mortar 16 inches thick; second stone 14 inches thick; the gable ends the same as the second stone; the corner stones and all the cap stones, which cover the windows and doors, came from Lynn—cost 10 cents per foot in Lynn; the under-pinning stones came from Lynn half dressed—cost 34 cents per foot there; the residue were slate rock from Boxford, cost 25 cents per cord—teaming, \$3 per cord. The chimneys are brick inside. Two stone arches in the cellar nine feet long, and a stone partition in the cellar. The chimneys are topped with stone. It takes a little more lime to lay these slate rocks, than to lay bricks. This house is intended for two families, but the rooms are small.

The mason's labor in laying all the rocks from the bottom of the cellar to the ridge pole, two chimneys, two ovens, and setting two boilers, laying the hearths, and doing all the plastering to the house, they boarding themselves, cost \$500—the rocks, lime and sand were hauled to the spot for them. The quantity of rocks for the cellars is unknown. The rough slate rock from Boxford was about fifty cords.

This house was built by contract, viz.: the contractor to find all the materials for the mason, carpenter and joiner, and white oak timber to cover the cellar—good seasoned and suitable stock for all the residue, and no saplin boards to be worked in the doors or floors; no pale burnt bricks to be used; in fine, every thing to be procured and done in a workmanlike manner for \$2300, including two sheds.”

I subjoin on this subject an extract from the letter of another respected correspondent in West Stockbridge, Berkshire Co. The materials here are abundant and beautiful.

“ With regard to stone buildings, I can say that here they can be built cheaper than what are called good wood houses. The price of laying the walls is from 3 cents to 3 1-2 cents per cubic foot; the

lime, sand, and stone delivered at the site. A gentleman of my acquaintance lately erected a stone dwelling-house in this neighborhood. He procured in the first place estimates for a wooden house. He kept an accurate account of all his expenses: and found, when he had finished, that the amount was \$75 less than the estimate for wood, besides the outside painting. The houses built from our materials are perfectly free from all moisture, or frost upon the inside of the walls; and are much the most comfortable dwellings, that we can erect. Could the people of the county be persuaded to build of stone in all eligible situations, it would add highly to the comfort of life in such a climate as ours; and free our children from an enormous expense."

[H.]

WEEDS AND THORNS.

There is in the neighborhood of Salem another weed supposed to have been recently introduced from Europe, which threatens to prove troublesome. I found it also in the fields in Amesbury. Dr. Bigelow, mentions it as extending itself in Medford and Charlestown. This is the Knapweed (*Centaurea Nigra*.) It is a harsh, stubborn weed, very difficult of extirpation. An intelligent botanist remarks of it, "that it should be pointed out to our farmers, who ought by all means to destroy it. It is a villanous weed, utterly unfit for fodder either green or dry. It is sometimes called the thistle without thorns; but it will prove a thorn in the sides of some of our husbandmen, difficult of expulsion, if it is suffered to continue its advances. It propagates by creeping roots and feathery seeds, very much after the manner of the white weed."

Canada Thistle. Of the tenacity of life and rapidity of propagation, which this plant displays, a striking proof is subjoined. "Mr. Courtis, an English gentleman, in order to test the astonishing powers of reproduction possessed by this plant, deposited about two inches of a root in his garden. In the course of one summer it had thrown out under-ground runners on every side; some of these runners were eight feet long; and some of them had thrown up leaves eight feet from the original root. The whole together were taken up; and, being washed, weighed four pounds. In the spring following it made its appearance on or about where the small piece was originally planted. There

were between fifty and sixty young plants, which must have eluded the gardener's search, though he was particularly careful in extracting them. From these facts it may be readily conceived how difficult it is to extirpate this weed, when once it has taken possession of the soil."

Thomas Spencer, of Salem, a gentleman distinguished for his fine taste and skill in botany, from whom I received the foregoing, allows me to add his opinion in regard to a native thorn for hedges. "There is a native shrub abundant in this vicinity most admirably adapted for fences; the common Cockspur Thorn (*Crataegus Crus Galli*.) In all the essentials of a fencing shrub it fully equals the English hawthorn to which indeed it is closely allied. The spikes of this shrub are more than an inch long, so that a hedge formed of it would present an almost impregnable barrier, bidding defiance to all intruders, whether biped or quadruped. Several plants of this shrub have been suffered to stand near the entrance of the Forest-river road till they have assumed the size of trees. In the spring they are covered with a profusion of white blossoms; and in the fall their rich scarlet fruit never fails to attract attention. In these particulars this shrub strikingly resembles its English congener. Indeed, the points of resemblance are so many and so striking, that it ought to be called the American hawthorn. Like the English haw its fruit requires two years to vegetate."

[I.]

BEES.

Extract from a Letter of a respected correspondent at Salem, January 2, 1838.

"I have long been deeply interested in the management of bees and shall continue the experiments upon hives, and the general management and preservation of this valuable insect, upon which I have been engaged the last four years, in the hope of adding something to the little already known.

"Your first inquiry is as follows. 'What do you hold to be the general and usual errors in the management of bees?'

"I presume this question to refer to that kind of management which

prevails among our farmers generally, and reply that I consider the ordinary construction of the hive to be the greatest error and the groundwork of all others. The stock from which they are made is usually less than one inch, and generally not more than three fourths of an inch in thickness; and the hives are composed of four upright pieces covered with a top, the whole unplanned and unpainted. Into this box the bees are put; and after a season of great and untiring industry on their part, they are all smothered by fumes of sulphur, and afterwards robbed of their treasures. Is not this murder and robbery too; and unnecessary, and therefore, doubly wicked murder and robbery? This evil can only be remedied by hives of a different and more substantial construction, or by attaching collateral, or top boxes to the ordinary hives, if any should be found worth it. There are several very excellent and newly constructed hives, each of which possesses some peculiar advantage, and any one of which is better than the ordinary country boxes. Those of Dr. Thacher and Mrs. Griffith, of our own country, and those of Mr. Nutt and Mr. Bagster of England, are the best that I know of. They are all on the bee-preserving principle; are well and substantially made, and so constructed as to afford good opportunities for watching the operations of the colony. Those of Dr. Thacher and Mrs. Griffith are fully described in Dr. Thacher's and Dr. Smith's Works on Bee-management, and need not be described here. Mr. Bagster's is complicated, (though very good,) and probably would not be generally used. Mr. Nutt's is more simple, can be easily made by any one who can use a plane and chisel, and is calculated to prevent swarming, if the apiarian choose so to do. I think too much cannot be said or done to prevent this wanton and unnecessary sacrifice of insect life, to which I have above referred: and I am satisfied that if Mr. Nutt's hive could come into general use, or a hive on similar principles, we should find in the country more cultivators of bees, better stocks, better management during all the year, and much better honey in the market. Should you think it worth while, I will, at some future time, give you a drawing and a description of this hive.

“I have spoken of the stock from which hives are usually made, as being too thin. No hive should be made from boards or rather plank, less than one and a quarter inch, and I should prefer even one and a half inch stock. The bees, by this thickness of wall to their homes, are kept in more even temperature, and less affected by sudden changes in the weather, both during winter and summer. This evenness of

temperature is of great consequence to them. I might, perhaps, just state that Mr. Nutt's hive consists of three boxes on a common floor. The centre or principal hive is that into which the swarm is first put, and to the sides of which the end hives are secured. From the centre to the side boxes are passage ways commanded by sliding tins. In the side boxes, are ventilating tubes, and at the period of swarming, by withdrawing the tins, and thus producing a circulation of air from the centre box through the ventilators, and by giving additional room, the bees will not swarm, but continue their labors in the collateral boxes. Mr. Nutt states, in his work, that in the year 1834, he took *two hundred and ninety six and a half pounds of pure honey from one hive*, thus made and managed. The front and back of the centre hive, in which the queen deposits all her eggs, and where, of course, the brood-comb is all found, is of one and a half inch well seasoned plank; the other parts are somewhat thinner. All the boxes are thoroughly made and well painted. I consider it by far, the best hive within my knowledge, and should rejoice to see it in general use. The pattern, which I have, has never been infested by the moth.

“Your next question relates to any remedies I may know against the ravages of the *Tinea*. How gladly would I make them known, if I knew any! I have, at present, no hope but in constant watchfulness and well made and tight hives. In M. Bevan's excellent work on the Bee, he observes that ‘hives are sometimes made of the red cedar, from its efficacy in keeping away the moth.’ I have constructed hives of this wood, but they were as much infested as any others in my apiary. A great variety of methods have been proposed for subduing this formidable enemy, all more or less useful, but none of them fully answering the purpose, and keeping off the intruder. I know of nothing to be applied, excepting the use of tight hives, constant care in frequently examining and sweeping the floor boards, shutting the entrance from $7\frac{1}{2}$ o'clock, P. M., to daybreak, &c.

“With regard to the question, ‘Whether bees may be allowed with safety and success to multiply indefinitely in a hive or room,’ I can give no reply founded on personal experience. I have been informed of instances in this neighborhood where they have been allowed to go on increasing and building, without swarming, to a considerable and profitable extent. I myself have not been engaged in the subject long enough to apply the test of experience. Having thought upon the subject, however, I last year built a very large hive, with large collateral boxes to try the experiment. Dr. Thacher is in favor of allowing

the bees to take their own course and to swarm. This is the opinion of the English apiarians generally, unless we except Nutt and Bagster. In Dr. Thacher's work pp. 71, 72, 73, are some minute statements and calculations on this point which seem to go against the prevention of swarming. Dr. Thacher's calculation is that each hive, if allowed to swarm, will yield, in addition to the swarms, say, twenty five pounds of honey, and that in the course of six years there would be an increase from one hive to the amount of sixty three stocks, yielding 1,515 lbs. of honey. A hive kept by Mr. Williams, of Ashfield, and which did not swarm, yielded but 384 pounds of honey and 47 pounds of wax. The advantage is here greatly in favor of swarming. But this amount from Mr. Williams' hive appears to me unaccountably small. The stock of bees must have gone on increasing at the rate of, say, 40,000 bees a year. Allowing the swarm to have consisted originally of 20,000, and the increase which I have supposed to take place, and the diminution to be one half the births annually, there ought to have been in the hive at the end of six years, no fewer than 140,000 bees. Now if, by Dr. Thacher's calculation, a common swarm yields 25 pounds annually more honey than they consume, there ought to have been at the end of six years, 625 pounds. This does not equal the produce by the non-swarming method. But I think 25 pounds annually, too low a rate. Taking but about one third of the amount obtained by Mr. Nutt's new hives, (that is, as I have said, 296 pounds,) we shall have, say, 100 pounds a year from a non-swarming hive, and this calculation, *if it should prove correct* for this country, would throw the advantage on the side of non-swarming. The whole subject is, however, very uncertain, and can only be tested by experience. I have several hives prepared for the express purpose of experimenting, and will give you the results of those experiments at some future period.

“There is one experiment which I design trying the next season, and which may throw some light upon this part of the subject. I have built a large hive with two large collateral boxes, each capable of holding a swarm. The communication between them is by means of apertures cut in the sides. These are closed by perforated tin slides. I design to put a swarm into the centre hive, and one into each of the collaterals, affording the latter an egress by the front of the box, separate from the entrance to the main hive. After they have worked 3 or 4 weeks separately, and a similar odor shall have diffused itself throughout the three boxes, by means of the perforated tins, I shall withdraw the slides and introduce them to each other, closing the ex-

ternal door of the collaterals. I think the bees will mingle, though I suppose the queens will do battle for the throne, and two of the three perish. If the bees agree, and I think they will, the work will go forward with great rapidity, and they will probably fill all three of the boxes. The centre one will hold enough for them all, and I shall take the two collaterals for rent and cost of the experiment. I say the centre box will support the bees through the following winter, for, by a long repeated series of experiments tried in France, it has been ascertained, that three and even four united stocks will not consume five pounds more of honey, than one stock alone. This fact is not generally known in this country. The experiment was instituted by M. Jonas de Gelieu, minister of the churches of Colombier and Auvergnier, in the principalities of Neuchatel. It may be found in the 'Bee Preserver' of M. Gelieu, translated from the French and published at Edinburgh in 1829. You will perceive that if this union of stocks can be effected in the fall, there will be no need of suffocation to get at the honey, for the apiarian can take, say, two hives, unite the bees with those of a third, where they may pass the coming winter, and have all the honey and wax of the two for use or for sale. This is a very important discovery, and ought to be tried here. M. Gelieu's method of wintering bees, by placing the hives without floor boards, on rafters laid a foot apart, across a *perfectly dark* and cold room, is very excellent and should be generally tried. I have five hives so placed by way of experiment."

[K.]

Dyking Salt Marsh.—LETTER TO COMMISSIONER OF AGRICULTURAL SURVEY.

"NEWBURY, NOV. 15, 1837.

"SIR,—In compliance with your wishes, I will detail with as much minuteness as my recollection will permit, the method pursued, and the result of my experiments on the subject of dykeing.

About fifteen years since, I enclosed ten acres of salt marsh by dykeing. The next season, I drained it by ditches eighteen inches wide and three feet deep—at about three rods distance from each other over most of the lot; in two instances, I left them six rods apart.

The second and third autumns after the dyke was built, I sowed herds-grass and red top. A small part of the herds-grass vegetated and grew very luxuriantly. The third and fourth years, I had herds-grass three feet high, with heads from four to eight inches long.

In November of the fourth year after building the dyke, in consequence of a very high tide, it gave way and the meadow was flowed all winter with salt water, which of course killed all the herds-grass. I repaired the dyke in the spring, and the second and third year after, I sowed the meadow with the above grasses, and in addition with white clover. But very little of either kind of grasses vegetated, and what did live, did not thrive. The herds-grass and red top, entirely run out by the second and third years after sowing. The white clover lingered along, but has never flourished well.

The third year after dykeing, I covered two rods of the meadow with loam, about one half inch deep, and sowed it with flax. It grew a foot and a half long, bore seed, and had a tolerable good haul. Thistles, mullen, and other kinds of weeds, have come up spontaneously, and grown much larger than the same kinds of weeds on the upland.

About three years since, I repeated my experiments of sowing grasses and flax. I chose the time in the spring, when the frost was out about the depth of three inches. I found the top of the ground peat, with a very small mixture of earth even at that little depth, and very tough. I succeeded in making the ground tolerably fine by tearing it to pieces with hoes and rakes, and sowed it as above mentioned. They all came well, but grew feebly until July, when the top of the ground became very dry, and they all died.

Notwithstanding these several failures, I think I have been well paid for all my expenses. The first three or four years after the dyke was built, I had a larger burthen of salt grass and of a better quality than before the salt water was excluded: as the salt grass died out, others came in and supplied its place. There were several patches of black or pigeon grass when the dyke was built. These have maintained their ground and rather increased, although they have been fed very closely. I have used most of the lot as a pasture: a small part I have mowed. For the two or three years while it was changing from salt to fresh grass, the quantity did not increase. Excepting those years there has been a gradual gaining from year to year to the present time. I should say on an average that the produce had been double what it was before dykeing.

From my experience and observation, I am led to conclude that

black grass would be the most profitable for cultivation. I have seen several small lots that have been dyked, and in every instance, where the black grass has been well rooted, it does not run out but yields abundantly.

The last five years I have used the turf as fuel. It burns much more freely than fresh meadow peat, but is not so durable. I should say four cords would be equal to three of the very best fresh meadow peat."

[L.]

LIME.

I subjoin a letter from the learned geological surveyor of Maine and Massachusetts, which is of an interesting and valuable character.

"BOSTON, Jan. 15th, 1838.

REV. HENRY COLMAN,

DEAR SIR :—In accordance with your request, I now beg leave to offer you a few general remarks on the subject of soils and the raising of wheat crops in the New England States.

A general opinion has prevailed in the community that our section of country was incapable of producing its own supply of bread stuff owing to the nature of the climate and the composition of the soil. So far as the climate is concerned, there is not the least difficulty in raising any kind of grain, but it is true that many of our soils require some modification by means chiefly of mineral manures, before they can be made productive.

I have for several years been an attentive observer of the management of soils, and believe that I have good reason to conclude from my observations that the amelioration of the soils of Massachusetts, may be conducted in such a manner as to render them very productive at small expense.

I find, by chemical examination of several remarkable soils, that a very minute quantity of carbonate of lime, viz. from 1 to 2 per cent. is amply sufficient to render them capable of bearing heavy crops of good wheat. I am also satisfied that a soil is incapable of producing wheat of good quality if it does not contain carbonate of lime; for this substance is an essential ingredient of the grain.

I have found during my geological researches in Maine, that those soils which were derived from the disintegration and decomposition of limestone rocks, were the most remarkable for their wheat crops. Such districts are very extensive in Maine, and will ere long become exceedingly valuable as grain soils.

I have seen on a single farm of less than 30 acres of unmanured land upon the Aroostook River in Maine, no less than 1000 bushels of grain, principally wheat, which was raised this last summer. The soil is alluvial and derived from limestone. In York and Oxford counties, I also noticed very excellent crops of wheat in soils derived from the disintegration of limestone, which alternates with gneiss. The whole of the district between Houlton and the Aroostook River, which is a portion of the public lands, is a most valuable wheat soil of immense importance to our country; north of the Aroostook to the St. John a similar tract of good soil exists, which in the course of time will become a most valuable farming country.

In the western part of Maine and throughout a large portion of Massachusetts the soil is wanting in lime, and is frequently charged with sulphate of iron. Such soils require liming in order to render them productive. In general we may say that wherever ferruginous waters percolate from a soil, that soil requires treatment with lime. The sulphate of iron in this case is decomposed by the lime or by the carbonate of lime, and gypsum is the resulting product, while the iron is left inert. Now we have a very simple calculation to make as to the quantity of lime required for a soil which is destitute of it, or which contains matters to be decomposed by it. Calculate by a simple trial how much lime is required for a given measure of soil and then calculate the superficial contents of the field and multiply it by the depth to which the lime will extend; other things being equal, 1 per cent. of lime will be sufficient. Ground bones form a valuable manure, and there are mills now at work preparing them for our farmers. Mr. Winchester the soap maker, formerly threw his refuse bones into the sea, but lately, I understand, he has hired laborers to dig them up for agricultural use.

Burnt bones are easily crushed to powder in a break mill, and will answer admirably as a top dressing. A few faggots are sufficient to burn a large heap of bones, since the fat they contain aids in the combustion. The refuse bone black of our sugar refineries is also a very valuable manure, insomuch that proposals were made to the East Boston Sugar Refinery, by Havre merchants, to send here for all the

refuse bone black, which they wished to purchase for agricultural use in France.

Is it not a shameful fact, that the French farmers are so much our superiors that they can afford to send here for manure, and then raise wheat, beans, corn, and other vegetables cheap enough to supply a large share to our market? Such you will notice by the importations last year is the fact.

If our farmers knew more respecting the chemical nature and methods of amending their soils then we might indeed look to our own fields for bread, but alas! there is a great deal of empyricism in agriculture, and it is no wonder that farmers distrust what they call "book learning" when they obtain so very little practical information from it. The fault is on both sides, first, because the books we have at present are very inaccurate; secondly, because the farmers generally do not know how to apply the information contained in books, since they do not know the composition of the soils in question.

If the Agricultural Survey is supported as it ought to be, and a degree of liberality is extended towards it, such as its importance merits, then we should soon be able to say with truth that Agriculture is a Science.

In order that we should come to this result we have to learn 1st, the geological origin, 2d, geological distribution, 3d, chemical composition, 4th, capabilities of soils. These three topics I shall endeavor to discuss in my Geological Report to the Legislatures of the two States of Massachusetts and Maine. We must not expect to make a perfect work at once: several years of assiduous labor must be devoted to each of the questions before us, before a good book on Agriculture can be produced. All the old works are too inaccurate to be relied upon. The light of modern science is required.

There are I believe several other questions proposed for discussion; but time will not allow me at present to enter upon them.

I will therefore now conclude this letter by offering you my best wishes for your success in the Agricultural Survey of our State; and shall be most happy, when my present labors are completed, to cooperate actively in your important avocations.

Most respectfully,

Your ob't servant,

CHARLES T. JACKSON."

[M.]

SMITH'S SUBSOIL PLOUGH.

I have prefixed to this Report two engravings of modern implements, which in England are deemed of immense value; and which bid fair, if adopted, to be of great importance in our husbandry: they are Smith's Subsoil Plough, and the Rack Heath Plough; both intended for the same object. The original engravings are imperfect: but they will at least give a clear idea to our ingenious mechanics of an implement that is much wanted among us, and I hope, lead to its early invention. An implement is wanted by which the cold gravelly subsoil often found in our lands, our wet lands especially, may be effectually stirred and loosened and rendered permeable to air and water, without at the same time bringing it to the surface, where it must require a length of time and a most copious supply of manure to render it productive: and also without burying the loam and richer parts of the soil under the subsoil as is necessarily done in such cases by deep ploughing with a common plough. We want to keep the richer parts of the soil, that is the mould, on the surface: where the plants can derive all the advantages possible from it, and where too, the manure applied to it will be most efficacious. At the same time it is important to loosen the subsoil, so that the water may pass off; and the roots of the plant, if so disposed, may spread themselves into it: and likewise that we may be gradually but constantly deepening the upper soil. I have myself seen so much the importance of doing this that I am persuaded this invention must be duly appreciated by the farmers. Its great utility likewise in draining many kinds of lands will be at once apparent. In many instances it will completely obviate the necessity of open or covered ditches. Its utility too in clay soils, but especially in many of our wet meadows, where the upper surface is thin and resting upon a hard pan, cannot admit of a question. It is of course designed to follow in the furrow of a common plough. The trenching of ground in considerable tracts in other countries, and in gardens in our own, has been followed by the best effects. Here the soil is dug thoroughly to the depth of two or three feet: and at the same time it is so managed, that the substratum is completely loosened and turned over, and the rich vegetable mould is returned again to the top, where it was at the commencement of the operation. These ploughs are adapted to operate in

the same way as this trenching by the spade. The increase of crops in grounds thus managed has been always an ample compensation for the labor. The loosening of the earth and the consequent removal of the water and admission of the air, besides affording room for the expansion of the roots, without doubt by a chemical action, assists the nourishment and growth of the plant. The great objection to deep ploughing has always been, that the cold gravelly pan was brought to the surface; the vegetable mould buried beneath it; and, that it required a great length of time and an extravagant amount of manure, to bring the land into a healthy and fruitful condition. These models are copied from a late number of the *British Farmer's Magazine*; and I subjoin the accounts which are therein given of them.

“The most astonishing effects appear to have been produced by a new agricultural implement, the invention of Mr. Smith of Deanster near Sterling in Scotland, called the Subsoil Plough. This machine is a necessary accompaniment to draining; but when that is done effectively, it seems calculated to render the most sterile and unproductive soil fertile and profitable. There is no difficulty more fatal to the practical farmer than that of cultivating a thin shallow soil with a stiff retentive subsoil. Whatever pains may be taken with the tillage of the former, however expensive the dressing which may be used in its cultivation, the nature of the subsoil will always counteract its beneficial effects. Many persons have endeavored by trenching to obviate this difficulty, but where the subsoil is of that sterile nature, and requires exposure to the atmosphere for so long a period to make it produce, few farmers have been found bold enough to repeat the experiment. Mr. Smith's ingenious invention, by breaking the subsoil without bringing it to the surface, renders it pervious both to air and water. The same chemical changes, which take place in a fallow, owing to its exposure to the action of wind and rain, are thus brought into operation in the subsoil: whilst the upper is in the ordinary course of cropping, and when, after a few years by a greater depth of ploughing, the subsoil is mixed with the upper, it is found to be so completely changed in its nature as to be capable of producing every species of grain. The experiment has been tried for twelve years, and with uniform success.”

[N.]

RACK HEATH PLOUGH.

The Rack Heath Plough. "The plate introduces to public notice, what in my humble estimation promises to be one of the most useful inventions ever exhibited to the farmer, whether of sharp clays or stiff gravels; and when I say this, I do not mean in the slightest degree to disparage the subsoil plough of Mr. Smith. I would rather include his implement in my encomium: because the objects of each being the same, viz., *loosening not turning up* the subsoil, I do not see why each invention should not have occurred simultaneously, without either of the authors being chargeable with plagiarism. The one is a *foot*, the other a *wheel* plough. The public must decide which is best.

"Sir Edward Stracey says, he invented his plough in the year 1833. He adds, I have broken up nearly 500 acres of heath land with this plough; my crops have been nearly doubled; the wheat produced on the land so broken up has been fine plump grain, weighing about 63½ lbs. to the imperial bushel; and it has fetched the best price in the market, when before the deep ploughing the land scarcely produced the seed; the wheat was poor and shrivelled; and as I had no manure to lay on the ground I can ascribe the goodness of the crop to nothing but the deep ploughing."

"For planting trees this plough far exceeds digging, as, by proper management, the soil may be broken two feet deep all around; instead of the young trees being crammed into a little hole, where they have no room to breathe; and the whole may be done at a fourth of the expense of trenching. Some of my neighbors are getting these ploughs for the express purpose of planting." [*British Farmer's Magazine for July 1837.*]

TOWNS.	LAND—ACRES.											Total Number of Acres.
	Village.	English and Ireland Moorings.	Fresh Meadows.	Salt Marsh.	Pastures.	Woods.	Unimproved.	Unimprovable.	Owned by the Town or other Proprietary.	In Roads.	Covered with Water.	
Amesbury,	706	1095	990	.....	5144	299	189	20	50	258	394	8415
Andover,	1385	3363	2335	.....	11337	2501	10,321	1868	170	1040	1417	35,737
Bradford,	577	1330	762	.....	4166	816	1512	10	1449	236	230	11,088
Boxford,	391	1398	832	.....	5474	1474	2742	853	.....	.....	.....	13,164
Beverly,	703	1912	303	71	3999	418	590	500	5	227	306	9094
Danvers,	861	3019	893	31	4794	721	2734	227	.....	471	148	13,899
Essex,	405	577	78	1882	2554	1095	5	120	.....	250	1200	8166
Gloucester,	339	942	26	635	1958	1862	761	1383	135	700	2275	11,016
Haverhill,	956	2487	757	.....	6391	1307	1139	.....	96	.....	.....	13,131
Hamilton,	483	724	778	.....	4139	998	470	.....	40	120	345	8097
Ipswich,	778	2000	469	3667	7483	403	1090	1690	.....	468	3579	21,627
Lynn,	607	1036	41	278	2154	993	101	121	259	.....	354	5947
Lynnfield,	311	415	725	.....	1205	554	1854	33	.....	95	115	5307
Methuen,	854	1515	1296	.....	4065	1142	5094	256	5	315	1045	15,787
Middleton,	225	715	1003	.....	1644	709	3234	428	.....	150	150	8258
Marblehead,	131	743	71	.....	672	.....	.....	.....	23	160	8	1808
Manchester,	134	440	66	49	229	128	.....	83	25	62	2	1218
Newburyport,	99	33	.....	.....	57	.....	.....	.....	211	130	7	537

TABLE—Continued.

TOWNS.	LAND—ACRES.											Total Number of Acres.
	Tillage.	Earth and Pland Mowing.	Fresh Meadow.	Salt Marsh.	Pasturage.	Wood.	Unimproved.	Unimprovable.	Owned by the Town or other Proprietary.	In Roads.	Covered with Water.	
Newbury, ...	804	1336	417	3700	6737	633	386	1252	630	581	2223	19,359
Rowley, ...	827	1180	958	1758	7354	2125	1405	1015	160	608	2025	19,355
Salisbury, ...	651	745	340	1257	4993	767	29	415	.....	.....	.....	9197
Saugus, ...	236	485	218	7.6	1588	1746	.....	.....	.....	120	.....	5129
Salem, ...	329	789	17	75	1918	.....	40	.....	280	.....	.....	3448
Topsfield, ...	476	989	1110	.....	4401	322	92	.....	.....	159	78	7557
West Newbury, ...	492	1433	1187		4500	310	10	60	66	351	1000	9409
Wenham, ...	353	646	496		1153	767	553	23		105	275	4371

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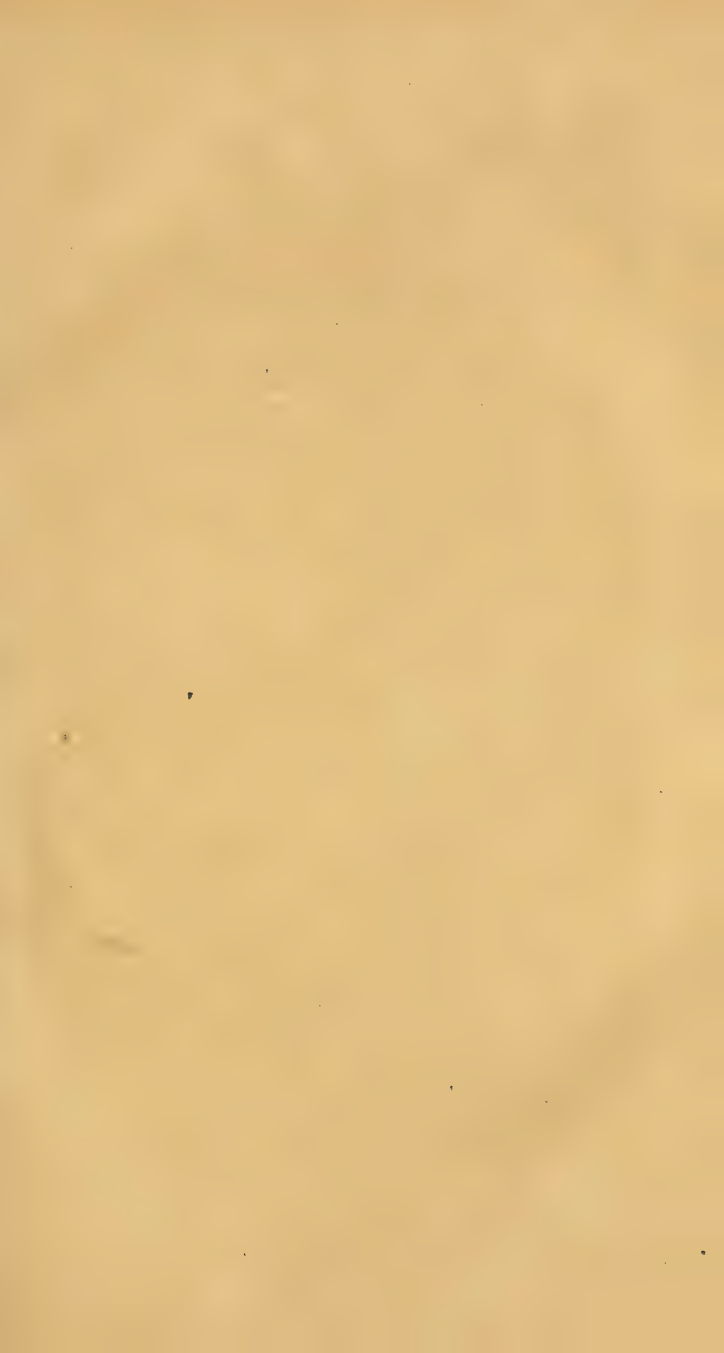
ERRATA.

Page 11—line 15—for “Cape Cod,” read “Cape Ann.”

“ 33—line 4—for “bushels,” read “bunches.”

“ 80—line 16—for “VI,” read “VII.”

“ 80—line 31—for “VII,” read “VIII.”





SECOND REPORT

OF THE

AGRICULTURE OF MASSACHUSETTS.

SECOND REPORT

ON THE

AGRICULTURE OF MASSACHUSETTS.

By HENRY COLMAN,

COMMISSIONER FOR THE AGRICULTURAL SURVEY OF THE STATE.

COUNTY OF BERKSHIRE,

1838.

Boston:

DUTTON AND WENTWORTH, STATE PRINTERS.

.....

1839.

Commonwealth of Massachusetts.

IN COUNCIL, Feb. 27, 1839.

His Excellency the Governor presents the Second Report of the Commissioner for the Agricultural Survey of the State, and it is thereupon *Ordered*, That the Secretary cause three thousand copies thereof to be printed.

Attest,

JOHN P. BIGELOW,

Secretary of the Commonwealth.

To His Excellency

EDWARD EVERETT,

Governor of Massachusetts :

SIR,—

I have the honor to submit to you my second Report of the Agriculture of Massachusetts. It is principally confined to the county of Berkshire ; but embraces also much incidental matter.

I have omitted in this report the consideration of one of the great interests of the agriculture of Berkshire, the Sheep Husbandry. I have gone largely into the other great interests of the county, the Dairy Husbandry ; and on that account judged it expedient to postpone the discussion of the Sheep Husbandry to the report of the agriculture of the county of Franklin. The agriculture of Berkshire and Franklin counties are in many respects similar and nearly related ; and in the report of Franklin, I propose to treat this subject at large.

The surveys of Franklin county and Middlesex county are completed, as far as I have deemed the views of the government to extend ; and the reports will be made with all practicable despatch. In the collection, arrangement, and comparison of such a variety of facts, however, as the survey necessarily embraces, time and labor are requisite to do justice to the subject and to the Commonwealth. No time shall be lost in finishing these reports, which are already in progress.

The report of Franklin will embrace among other subjects an extended view of the Sheep Husbandry ; and the report of Middlesex the culture of hops, the redemption of peat-bogs, and particular improvements in the cultivation of arable lands ; on which subjects information has been particularly solicited. The counties of Worcester and Hampshire have been half explored.

I had great pleasure in attending the Cattle Shows of the Middlesex, Worcester, and Hampshire, Hampden and Franklin Agricultural Societies ; and the town Shows of Barre and Petersham ; and in witnessing the spirit of improvement every where awake.

Having at my personal expense obtained as exact returns as I could get of the agricultural produce of several towns in different parts of the Commonwealth, Pittsfield in Berkshire, Bernardston in Franklin, Barre in Worcester, and Marlboro' in Middlesex, and deeming these documents of much interest to the agricultural community, I shall annex the four last to this report, without delaying their publication for the reports of the counties to which they appropriately belong. If desirable, they can be reprinted in their proper connexion.

I have procured for gratuitous distribution among the farmers, some of the best wheat of Portugal ; of the best teasle seed from Germany ; a barrel of genuine Italian wheat ; and a very superior variety of Indian corn. I have likewise sent to Leghorn and Sicily for the best varieties of Indian corn and wheat known in those countries. While I sustain my present official relation to the agriculture of the Commonwealth I shall avail myself of every opportunity of advancing in this or any other way the interests of the farmers. I have already laid the foundation for the benefit of the Commonwealth, of an agricultural museum, intended to embrace samples of the best agricultural products of the State and country, which are susceptible of permanent preservation. Several varieties of corn, grains, and grasses, have been sent in ; and specimens of some valuable implements.

I have taken measures to procure a complete collection of specimens of the grasses of the Commonwealth ; and of the weeds most pernicious to agriculture ; in the hope, that from these beginnings, which must necessarily be small, a respectable collection may be at last formed, the utility of which must be obvious.

The extensive correspondence occasioned by this appointment, the various inquiries on agricultural subjects daily addressed to me, and the respectable attendance upon the meetings of farmers and others for agricultural conversation and discussion, which have been held weekly during the session of the Legislature in the Representatives Hall, at the instance of the Commissioner, evince the concern which is so extensively felt in this great interest of the community, and the strong desire for information. In being obliged to go on thus single-handed, I cannot but hope that my strong claims upon the candor of the agricultural community will be admitted.

Permit me, sir, to add, that, as a native of Massachusetts, it affords me the highest pleasure and pride, that this survey has been undertaken and continued under the auspices of a chief magistrate, who, to the most intelligent discernment and the most just appreciation of the true interests of the Commonwealth, adds a hearty and untiring devotion of his time and talents to their accomplishment.

I have the honor to be, Sir,

With the highest respect,

Your fellow-citizen,

HENRY COLMAN.

Boston, Feb. 1839.

R E P O R T

ON THE

AGRICULTURE OF THE COUNTY OF BERKSHIRE.

GENERAL DESCRIPTION.

1. **BOUNDARIES AND SITUATION.** The County of Berkshire forms the western part of Massachusetts. On the north line it is bounded by Vermont; on the west by New York; on the south by Connecticut. On the east it lies contiguous to the counties of Franklin, Hampshire, and Hampden. Its length on the western line exceeds fifty-seven miles. Its breadth at the north, on a line running east and west, is about fourteen miles—at the south, where it is bounded by Connecticut by a line parallel with its northern line, its breadth is about twenty-four miles. The breadth in some parts north of the south line, reaches to twenty-six miles; and in parts not far from the centre of the county, it is about sixteen miles. It lies between Lat. $42^{\circ} 2'$ —and $42^{\circ} 44'$ north. The longitude of the north-west corner of the county is nearly $73^{\circ} 23'$ west; that of the south-west corner is a little greater. The area of the county is about 950 square miles or 608,000 square acres. The towns embraced within the limits of this county are thirty; and the population by the official returns of May, 1837, was 39,101.

2. **DIVISION OF TERRITORY.** From the reports of the valuation Committee we gather the following returns: There are in Berkshire county

In Tillage,	-	-	-	Acres	26,817 $\frac{11}{24}$
English and Upland Mowing,	-	-	-	"	55,495
Fresh Meadow,	-	-	-	"	7,729 $\frac{3}{4}$
Pasturage,	-	-	-	"	117,059 $\frac{1}{12}$
Wood,	-	-	-	"	60,997 $\frac{1}{3}$
Unimproved,	-	-	-	"	123,966 $\frac{1}{2}$
Unimprovable,	-	-	-	"	103,694 $\frac{5}{12}$
Owned by Towns or other Proprietaries,	-	-	-	"	15,010
In Roads,	-	-	-	"	6,623 $\frac{1}{2}$
Covered with water,	-	-	-	"	7,261 $\frac{1}{2}$
Total,					524,655 $\frac{13}{24}$

3. GENERAL FEATURES AND ASPECT. The county of Berkshire is an inland county ; at its nearest point it is about twenty-five miles from any navigable waters. The county is well watered. The Housatonic river, a small stream, extends through it longitudinally. It rises from within about twelve miles of its northern boundary, and flowing in a southerly direction, it receives on its passage the contributions of many minor streams, until it passes beyond the bounds of the state into Connecticut, and empties at last into Long Island Sound. The Hosick river rises in the immediate vicinity of the fountain head of the Housatonic ; flowing northerly and then westerly it passes through the south-west corner of Vermont into New York and presently mingles its waters with those of the Hudson. Deerfield river passes for a short distance through the northern part of this county. Two branches of the Westfield river take their rise likewise in this county ; and two streams of inconsiderable size under the name of Green river ; one in the northern part, emptying into the Hosick and one on the south emptying in Sheffield into the Housatonic, are likewise deserving of notice. There are other streams, furnishing multiplied advantages to farmers and manufacturers ; and presenting valuable sites for mills and mechanical objects, which it is not necessary to particularize. The hills everywhere abound in springs of the purest water ; and in an agricultural view no country can be better supplied. The Pontoosuck lake in nearly the centre of the county, one of the largest collections of

water in the county, presents its mirrored surface to the traveller as one of the most beautiful objects on which the eye can rest. After furnishing several extensive and valuable mill powers at its out-let, its superfluous waters flow southerly until they mingle in the Housatonic.

The surface of the country is broken and mountainous. There are generally considered three distinct ranges of mountains running from north to south the whole length of the county. The easterly branch or range of mountains is a part of the Green mountains, which reach far into Vermont. The westerly branch is denominated the Taconic Range. The intermediate mountains are known by various local names, and are rather insular elevations than a continued range. Saddle Mountain in the north-western corner of the county, and Mount Washington forming its south-western corner are magnificent elevations and the highest mountains in the State. Saddle mountain has in many places been cleared high up its sides; but its summits are crowned with a thick and beautiful forest of maple, oak, walnut and other varieties of hard wood. The ascent of Mount Washington on the western and the north-eastern side is long and wearisome, but not difficult; and after ascending by the course of the road two miles or more, you reach an extended space of gently undulating country, and almost entirely surrounded by a belt or succession of hills of different elevations, which, from a distance, and before the mountain was ascended, seemed to form only a single elevation. This comparatively level space is cleared and cultivated, furnishing many valuable farms favorable for pasturage. It forms the town of Mt. Washington, which now includes the whole elevated country, and that small portion of territory, making the south-western angle of the state, and known as Boston Corner.

The Hosick mountain, lying at the north-eastern part of the county, is a considerable elevation, difficult of ascent by the road on the eastern side; and steeper, and in some parts precipitous, on its western side. The stage road passes over this mountain; and like Mount Washington, the top of the mountain presents a rolling country, with a productive soil, furnishing excellent pasturage, and valuable and thrifty farms. The other mountains in the county are insulated. Several of them are immense masses of lime-stone and marble; but

many of the minor elevations are rounded and beautiful summits, cultivated to their tops.

4. **SOILS.**—In passing through the county from east to west, you meet a succession of valleys of remarkable beauty and fertility ; and on the Housatonic, the Hosick, the Green river, and Hop Brook, there are extended alluvions or intervalles, which furnish a productive soil. The hills every where abound with springs of the purest water ; and these added to the numerous permanent streams intersecting the country in various directions, afford extraordinary advantages to the farmers of Berkshire over the tenants of a level country.

The alluvial meadows on the Housatonic seldom exceed a mile in breadth. These are mainly to be found in the Pittsfield valley, in South Lee, in Stockbridge, in Great Barrington, and in Sheffield. In general, these lands are annually overflowed, and the deposits of rich mud superinduced by such freshets, prevent the necessity of any artificial manuring ; and keep these lands in a state of exuberant fertility. These deposits are mainly composed of finely comminuted sand, and rich loam and vegetable mould ; and in many cases the deposits have accumulated to a great depth, as the presence of large logs and partially decayed stumps and roots of trees, found often at the depth of fifteen and twenty feet below the surface, evince.

Of peat bogs, there are few in the county. These are of small extent ; but some found in the neighborhood of Pittsfield, which have undergone the process of ditching, draining, and manuring, present encouraging examples of an enterprising and intelligent husbandry. This description of land throughout the state is destined to become highly valuable and productive. For fuel, where the use of peat for fuel prevails, this land, or rather the right to dig the peat, is sold for three dollars per square rod, the purchaser being limited as to the depth he shall go. As manure for upland, when decomposed and dissolved by heating manures, or deposited in the barn yard, where it absorbs the liquids of the manure heap, it has been found efficacious and valuable. As land for cropping, under good management, of which I propose presently to give several remarkable examples, it has proved eminently productive in grass, potatoes, turnips, and carrots.

The soils in Berkshire are various. There is little pure clay. There is little pure sand. The Hosick mountain and the Green

mountain range is generally composed of granitic rock. The other mountains, and in general the rest of the county, rest upon beds of limestone or mica slate, which sometimes rise into high and abrupt elevations, and are every where to be seen showing themselves above the surface. Some parts of the county are rich in iron ore, especially the beautiful valley of Richmond, and the vicinity of the highlands designated as Mount Osceola. In many parts of the county, as in Lanesboro', Williamstown, and Stockbridge, the soil presents the appearance of rich vegetable mould resting upon a substratum of a greenish color, strongly argillaceous, and retentive of moisture. The same remarks apply to the soils in Cheshire, furnishing the richest pasturage to be found in the state. These lands are well adapted to grass, potatoes, and all esculent vegetables. Other lands in the county are better suited to grain crops, being gravelly and abounding in calcareous matter ; as the Pittsfield valley ; much of the land in Great Barrington, west of the village ; and especially the town of Egremont, and the lands lying towards the eastern side of Mount Washington, on the great road from Egremont to Salisbury in Connecticut.

It is a singular fact, not less surprising to the learned geological surveyor than to others, that the soils in Berkshire, though resting upon limestone, contain no larger proportion of the carbonate of lime in a state of detrition, than many other soils in the state where limestone is not found. It was supposed, that the continual abrasion or decomposition of the stones by the natural operations constantly going on, or by cultivation, would have imparted a large proportion of this ingredient to the soils. Nor can its absence be accounted for on the supposition, that it existed in much greater quantities formerly, but has been exhausted by cultivation. Much of the land in the county is comparatively new ; and, as the crops throughout the county are generally consumed on the farms, it would seem as though what had been taken up by them, which, after all, is a very minute quantity, must have been again returned in the manures applied. Is it not more probable, that as the country is comparatively new, and the vegetable mould consequently more abundant, the specimens analyzed may have been taken near the surface, and therefore exhibit a less quantity of the carbonate of lime than if the country

had been longer cultivated, and the vegetable mould, the accumulation of centuries, had been more nearly exhausted ?

Of the advantages in respect to fertility of a considerable proportion of calcareous matter in soils, there is no doubt. Yet the operation of lime in any of its forms to the purposes of vegetation is as yet a subject involved in so much obscurity, that we can hardly speak upon it with any confidence ; and the particular office that it performs in the wonderful processes of vegetable life and growth, is among those triumphs which chemical science has yet to achieve.

The theory of Dr. Dana, of Lowell, given in the report of the learned geological surveyor, of the last year, is original and probable. Future experiments, and much more extended observations are necessary, in order to determine its soundness. The fertility of a soil depends, to a certain extent, upon the presence of lime ; but it is not in proportion to its quantity. The presence of lime in the form of a carbonate amounts, it seems, in some of the fertile soils of Europe, as given by the French chemists, to 25, 28, 30, and $37\frac{1}{2}$ per cent. ; yet in some of the richest of the western soils it does not amount to more than 3.3 per cent. ; and lime, in all its forms, does not exceed 5.1 per cent. This is certainly a great disparity ; and it suggests the inquiry, whether this difference is actual, or the result of different modes of analysis or examination. The theory of Dr. Dana, and the observations of many intelligent practical men confirm the suggestions, implies that the office performed by lime in the soil is not primary, but secondary. The most productive soils are those in which the various earths are compounded but not chemically combined ; but the earths alone, however intermixed, will not give fertility, without vegetable soluble matter. The quantity of lime or of silex taken up in the formation of the plant is small and inconsiderable. The vegetable matter in the soil constitutes the food of plants. Lime and marls may be useful in their mechanical influences and changes upon soils of an aluminous and argillaceous character, when applied in large quantities ; a use, which the cost of lime in Massachusetts forbids us to expect will prevail to any considerable extent, excepting in the limestone regions. But it would seem, that the main effects to be expected from lime is in neutralizing the acids, which render a soil sour and unproductive ; in converting insoluble into soluble matter ; and in thus preparing the vegetable matter in the soil for the food of

plants, and bringing it into a condition by which it can be taken up by their roots. The mode by which lime assists vegetation is still unascertained. Nature draws an impenetrable veil over her subtle operations; and at a certain point, human sagacity, however acute and prying, is repelled under the stern mandate, "Hitherto shalt thou come, but no farther." The rich alluvial soils of the West, and the calcareous regions of western New York, are equally productive of wheat. We have instances of like success, and uniform success, in which, wheat has been constantly cultivated with hardly a failure, (and where, when it has failed, its failure has evidently depended upon external atmospheric influences, rather than upon any conditions of the soil,) for periods of many years on the same farm; and at the ordinary yield of from twenty to thirty bushels to the acre. This has happened on alluvial lands and granitic soils, where the presence of lime has scarcely been detected, and where none has been artificially applied. We have a high opinion of the value of lime applied to the land in the form of a sulphate, as plaster of paris, or of phosphate, as in bone manure; or as a carbonate in the form of ground lime-stone, or as quick lime, which soon becomes carbonated. We have a high opinion of other alkaline manures, when applied to the soil, though the beneficial results, as of common wood ashes for example, are not always seen, and not always uniform. But the fertility of a soil depends much more upon the vegetable matter contained in it, what Dr. Dana denominates the "geine," or vegetable food, than upon the presence or absence of any particular earth or salts. The efficacy of lime and ashes I do not question; but their indispensableness in any quantity beyond what the former is found, in some form, in most soils, (and I understand Dr. Dana to say that the particular form in which it is found, is of little comparative importance,) is not so far confirmed by any facts which have yet come to light in the experience of some of the most observing farmers of the state, that it may be considered as established. But on this subject I shall have occasion to speak hereafter.

The soils in the county of Berkshire abound in rich vegetable mould. Any person who has seen the luxuriant pastures of Cheshire, the hills in Lanesboro' Lenox and Stockbridge, the vicinity of Pittsfield, both the rolling grounds and the meadows on the Housatonic, and some of the beautiful lands in the neighborhood of

Green river in Great Barrington, Konkapot river in Sheffield, Guelder Hollow in Egremont, the alluvial lands in Lee, and the valley of Great Barrington as well as parts of Richmond, Hancock, and Williamstown, and other parts of the county equally deserve to be named, can have no question of the abundance of vegetable mould, and the eminent fertility of much of this favored territory.

5. **MARKETS AND MANUFACTURES.**—In an agricultural view the county of Berkshire is singularly favored in respect to its climate, its soil, its water, its capacity of production, and its vicinity to markets. By the great lines of communication now in the course of construction, and which concentrate in this county, it will be brought into much nearer communication with the great marts upon the seaboard. With the exception of pork, which has usually gone to Hartford, and in some rare instances to Boston, the produce of Berkshire beyond what is demanded for their manufacturing population, goes to New York. The Hudson is reached from almost any part of the country in a distance of thirty-five to forty miles; and from all the points on that magnificent thoroughfare of wealth and population, the city of New York is reached in a few hours. The immense consumption of this great city, this insatiable consumer, demands all the contributions which can be poured into it, for use or traffic.

The greater part of the population of Berkshire are occupied in the pursuits of agriculture. The establishment of manufacturing villages creates a demand for the products of agricultural labor, and a permanent and certain home market is established for the supplies, which the farm will furnish. The manufactures bearing directly upon agriculture, are those of woollen cloths and paper. The number of pounds of wool used by the factories in the county from the returns of 1837, appears to have been 875,957 lbs. The amount of teasels purchased by these same manufactures is not ascertained. The quantity of paper manufactured amounted in value to 333,000 dollars. What amount of this was in paper made from the straw of oats or rye cannot be determined. "In 1837," an intelligent farmer of Lee writes me, "about five hundred tons had been used in their manufactures. Wheat, rye, and oat straw, if not rusted, was used indiscriminately, and was purchased at the mills at \$5 per ton." The advantages to agriculture of the latter kind of manufactures, and of

the appropriation of the straw of a farm to such purposes, is, to say the least, of an equivocal character.

6. CLIMATE.—The season in Berkshire, is in the valleys not very different from that on the Atlantic coast. I shall subjoin some meterological tables kept at my request by an intelligent observer in Lenox ; and shall add to these a table from the memoirs of the American Academy, showing the comparative progress of vegetation on a former occasion. With the exception of the high-lands and the mountainous portions of Berkshire, there are no crops raised in other parts of the state, which may not be cultivated to advantage. Indian corn is often successfully cultivated in some of the elevated locations ; but these places are most favorable to oats and barley. Potatoes and turnips are likewise abundant in these hill towns, and the former of superior quality. The springs, however, in these parts of the county, are generally about three weeks in the rear of those in the valleys ; the cold winds from the north sweep over them and retard vegetation. The autumnal frosts on the other hand, seem proportionately kept back ; and vegetation here retains its verdure ; and potatoes, for example, continue to grow sometimes for weeks after every thing has been destroyed by the frosts in the low-grounds.*

II. CROPS.

The crops in Berkshire are those cultivated in other parts of the state ; and consist of the usual grasses, herds grass, red top, and clover. Of grains, Indian corn, wheat, barley, rye, and oats ; and of esculent vegetables, potatoes, carrots, ruta бага, mangel wurtzel, and common white turnip. In addition to these, buck-wheat is raised to a considerable extent, some small amount of flax, and comparatively large amounts of teasels. The cultivation of hops was at one time attended to in some places ; but is abandoned on account of the low price. Large amounts of rye have heretofore been used for distillation ; but this is now pursued to a small extent.

Indian corn, the great grain crop of New England, with the exception of the two cold years 1836 and 1837, has been always

* Appendix A.

raised in the favorable locations in Berkshire with advantage. In some towns, however, the high prices obtained for wool induced the farmers to abandon entirely the growing of grain for bread, and devote their farms to the sheep husbandry.

Of corn, large crops have been frequently raised. In one of the hill towns more than one hundred and ten bushels have been more than once obtained. In these cases a favorable situation was selected on the southern declivity of a hill, and the best cultivation was employed, the ground having been highly dressed with the spent ashes of a potash establishment.

1. AMOUNTS OF CROPS.—I shall subjoin some statements of the amount of crops in Berkshire. In many cases, wherever practicable, I have collected a number of respectable farmers together, and obtained from them some general average of the crops in the town. In other cases I have obtained from individuals, distinguished for their practical skill and knowledge, the average amount of their own crops, either in conversation, or from the farm reports with which they have favored me.

In Sheffield the crops of corn are rated at 30 bushels to the acre. 60, 80, 93, and 110 have been obtained. Of oats, 35 to 50 bushels are the average product. 80 bushels, 84 bushels and upwards have been obtained. Of rye, 6 acres gave 30 bushels to the acre—8 acres gave 30—and one acre $46\frac{1}{2}$ bushels. Of buckwheat, 30 bushels. Of wheat, without manure 18 to 20 bushels—29 bushels, 34 bushels, 36 bushels, 40 bushels have been obtained. Of potatoes 200 bushels—2 acres gave 600 bushels— $\frac{1}{4}$ of an acre gave 165—rutabaga 800 bushels.—pease, in one case, 100 bushels on 2 acres. Of hay, on the alluvial lands 2 tons—and in two cases, one of 4 acres and one of 5 acres, 3 tons were obtained. In the eastern part of the town, called Konkapot, from the name of the small stream flowing through it, the subjoined actual crops have been obtained to the acre. Corn 60 bushels, wheat 40, oats 50, 60, rye 25, potatoes 300. In Egremont the crops are thus rated:—corn without manure, but plastered; 25 to 35 bushels, 40, 50 and 55 bushels—rye 12 to 15 bushels—oats 35 to 40—wheat 15—potatoes 175 to 200—hay $1\frac{1}{4}$ to $2\frac{1}{2}$ tons. Fifteen acres produced 52 bushels of corn to the acre, and the same land afterwards yielded 1100

bushels of oats ; 700 bushels of rye have been obtained on thirty-two acres.

In Great Barrington, corn is rated at 49, 59 bushels ; 70 bushels and 102 have been obtained. Rye at $12\frac{1}{2}$, 24. Oats, 30, 40 ; 90 bushels to the acre were raised last year upon 8 acres of land. Wheat, 12 bs., 18 bs. Pease and oats, 35 bs. Ruta bage, 700 bs. Potatoes, 175, $320\frac{1}{2}$. Grass, $1\frac{1}{4}$, $1\frac{3}{4}$ tons.

In Stockbridge, corn, 40 bs. 45 bs. to the acre. Rye, 35 bs. 35 bs., once 40 bs. Barley, 25 bs. Potatoes, 225 bs., 300 bs. These returns from two highly intelligent farmers. The only returns of wheat obtained, were 35 bs. 38 bs. measured to the acre. In one case, 4 tons of hay to the acre.

In New Marlboro', corn, plastered only, 20 bs.; manured, 30 bs. Rye, 12, 20 bs. Spring wheat manured, 20 bs. Oats, 30 bs. Potatoes, 200. 60 bs. of oats have been raised ; 400 bs. of potatoes. Grass, $1\frac{1}{4}$ ton, $1\frac{1}{2}$ ton.

In Dalton, one farmer rates his crops of corn, at 40 bs.; of rye, at 15 bs; of potatoes, 300 bs.; and has obtained 80 bs. of wheat from two acres.

In Otis, the crops are, of corn, 30 to 50 bs.; of rye, 20 bs.; of oats, 35 bs.; 70 bushels have sometimes been obtained ; of hay, 1 ton.

In Richmond, through the public spirited exertions of a highly intelligent and respected friend, my returns are more numerous than from any other part of the county. Wheat is returned at 10 bs., $11\frac{1}{2}$, 12, 13, 15, $16\frac{1}{2}$, $17\frac{1}{2}$ to the acre. Corn, at 30 bs., 32, 40, 50, 54, 60. Oats, 20 bs., 25, 30, 32, 35, 40, 58. Rye, 9, 12, 14, 30. Buckwheat, 10, $12\frac{1}{2}$, 32, 35. Pease, 24. Ruta bage, 400, 660. Potatoes, 150, 160, 175, 180, 200, 208, 225.

In Alford, my returns are, corn, 40 bs.; through the town, 25 bs. Wheat, 15. Rye, 10. Oats, 35. Buckwheat, 25. Potatoes, 200. 80 bs. oats have been measured from an acre ; and $2\frac{1}{2}$ and 3 tons of hay. The town of Alford does much more than produce its own bread, pork and beef.

In Lenox, the average returns given me were as follows : Corn, manured, 40 bs. Wheat, 20. Rye, 15. Oats, 40. Grass, $1\frac{1}{2}$ tons. Extraordinary crops were likewise authenticated : Corn, in

two cases, 120 bs. Spring wheat, 37 bs. Winter rye, 40 bs. Summer rye, 25 bs. Oats, 80 bs.

In Lee, the returns were, Corn, 30 bs. Winter rye, 15 bs. Oats, 40 bs. Buckwheat, 28 bs. Ruta bage, 400 bs. Potatoes, 300, 400 bs. Fifty and sixty bushels of oats have been obtained ; rye, 40 bs. on new land ; 80 bs. Corn ; 700 and 900 Ruta bage. One farmer states, that in 1837 on $2\frac{1}{2}$ acres, he raised 2000 bs. Ruta bage, and on 2 acres, 1200 bs. of Carrots.

In West Stockbridge, the reports given are, Winter wheat, 25 to 30 bs. Corn, 40 bs. Oats, 50 bs. Rye, 15 bs. Potatoes, 200 bs. 400 bs. In last case, 30 bs. were used for seed.

In Pittsfield, the crops are thus rated. Corn, 30 bs. 40 bs. Oats, 35 bs. 40 bs. 45 bs. Wheat, 15 bs., 18 bs., 20 bs. Rye, 20 bs. Potatoes, 250 bs. The following are extraordinary and well authenticated returns—Three and one quarter acres produced 1280 bs. Potatoes ; 1 acre and 66 rods, 1700 bs. Ruta bage. The crops of another farmer, whose cultivation is excellent, are rated thus : Corn, 50 bs. ; Oats, 45 bs. ; Rye, 25 bs. ; two acres of Potatoes in 1837, produced him 560 bs. to the acre ; $1\frac{1}{4}$ acre gave him 900 bs. Ruta bage. Another farmer, from 9 acres, obtained at one crop, 160 bs. Wheat ; Meslin, Rye and Wheat, 80 bs.—240 bs., or 26 4-9 bs. to an acre. From 14 acres, he obtained 190 bs. Wheat ; 120 Meslin ; 90 Rye ; 400 bushels ; or 28 4-7 bs. to an acre. Grass, $1\frac{1}{2}$ ton, 2 tons.

The return of crops in Lanesboro', give, of Wheat, 20 and 25 bs. ; Corn, 50 bs. ; Oats, 40 ; Ruta bage, 900 bs.

In Williamstown, I am favored with the returns only of a single farmer, whose cultivation is highly creditable to him. Wheat, 20 bs. Oats, 50 to 70 bs. Corn, 50 to 60 bs. Barley, 20 bs. Potatoes, 350 to 400 bs.

In Cheshire, the product of corn is rated at 40 bs. Oats at 40 bs. Wheat, 20 bs. In 1836, 3 acres produced more than 1800 bs. Potatoes ; in 1837, $2\frac{1}{2}$ acres, 1000 bs. Potatoes.

I could extend the above returns ; but these will present a fair sample of the common cultivation of the county.

2. ROTATION OF CROPS.—The usual rotation of crops is corn or potatoes, in most cases manured ; then oats ; third crop, wheat or some other grain, with which the land is laid down to grass. The

land then commonly remains in grass for two or three years, and the same process is repeated. There are cases in which the same crop is pursued on the same land, two or three years in succession, and without diminution of the crop. These are cases of extraordinary fertility or abundant manuring ; but it is not a practice greatly prevalent ; nor to be generally commended.

3. EXPENSES AND PROFITS OF CROPS.—I have been anxious to obtain true returns of the actual expenses and profits of crops in a regular rotation ; and I shall subjoin minutes of these expenses, furnished by experienced and judicious farmers in different parts of the county.

In the estimates which have been made of the expenses of cultivating any crops, it will be understood, that a man's labor has always been estimated at one dollar per day ; and the same for a yoke of oxen, and half a dollar for a horse. In many parts of the country this, undoubtedly, is an over-estimate of the price of labor ; but it seemed necessary to fix some price as a uniform standard throughout the state ; and in the cost of labor involved in the production of any crop, one dollar is to be considered as the representative of a day's work. The prices of labor and the prices of board vary in different parts of the state. The estimated price includes both labor and board.

Expenses of cultivating an acre of corn in Sheffield, Mass.

Ploughing, ...	\$1 50
Manuring, 15 loads, at 50 cents, half the manure to be charged to the corn, ...	3 75
Getting out manure, \$2 ; planting, \$1 25 ; seed, 25, ...	3 50
Hoeing twice, \$2 ; gathering and husking, \$2, ...	4 00
Interest on land, at \$50 per acre, ...	3 00
	\$15 75

Product.

Corn-stalks for fodder, equal to $\frac{3}{4}$ ton of hay, ...	\$5 00
Forty-five bushels of corn, at 75 cts, ...	33 75
	\$38 75
Profit on the corn, ...	\$23 00

Estimated expenses of an acre of Potatoes.

Ploughing, ...	\$1 50
Manuring as per corn, \$3 75 ; hoeing, \$4 00, ...	7 75
Digging the crop, \$12 ; interest on land, \$3, ...	15 00
Seed, 15 bushels, ...	3 75
	\$28 00

Product, if 300 bushels, ...	\$75 00
“ 400 “	100 00
Suppose 300 bushels,—Profit, ...	\$47 00

Estimated expenses of an acre of Ruta Baga.

Ploughing and preparing ground, planting on ridges, eight days, ...	\$8 00
Twenty loads of manure, half charged to this crop, ...	5 00
Seed, \$1 ; sowing with machine, 50 cts., ...	1 50
Fifteen days' hoeing, \$15 ; 12 days' harvesting, \$12, ...	27 00
Rent of land, at \$50, ...	3 00
	\$44 50
Product of above, 800 bushels, at 12½.	100 00
Profit, ...	\$55 50
Cost 5⅔ cts. per bushel.	

I give another estimate in Sheffield.

Corn,—one acre.

Ploughing, ...	\$1 75
Manured in the hill, 20 loads, half to the corn, ...	5 00
Seed, 6 qts., 25 cts.; manuring and furrowing, \$4, ...	4 25
Planting, \$2 ; hoeing, \$3, ...	5 00
Topping and binding stalks, \$1 ; gathering and shocking, \$2, ...	3 00
Interest on land, valued at \$40, ...	2 40
	\$21 40

Product.

Thirty-five bushels corn, at 75 cts.,	\$26 25
Stalks, valued at twice cost of cutting,	2 00
Bottom stalks or butts,	1 00
	\$29 25
Profits,	
	\$7 85

A very different estimate from the preceding is generally put upon the stalks. Throughout the state, the farmers, who are careful and successful in the management of their corn fodder, consider it for any neat stock as equal in value to three-fourths, and most of them to a ton of hay.

Another farm in Sheffield, on the alluvial or river land, gives the following estimate :

Ploughing,	\$2 50
Ten loads of manure in the hill, half to the corn,	2 50
Getting out manure,	2 00
Planting, \$1 ; seed, 25 cts.	1 25
Hoeing three times,	4 00
Topping the stalks,	50
Gathering and husking,	3 00
Interest on land, at \$75,	4 50
	\$20 25

Produce.

Sixty bushels corn, at 75 cts.,	\$45 00
Corn fodder,	3 00
	\$48 00
Balance in favor of the crop,	\$27 75

Egremont.—The usual rotation is oats, rye, corn, oats or rye and grass seed.

Expenses of an acre of corn.

Ploughing and harrowing,	\$1 50
Manure, 15 loads, half charged to the corn crop,	3 75
Getting out manure, \$1 ; planting, \$1 ; seed, 25 cts.,	2 25

Hoeing three times, \$3 ; gathering and husking, \$2,	5 00
Interest on land, at \$40,	2 40
	\$14 90

Produce.

Twenty-five bushels, at \$1,	\$25 00
Top stalks,	1 00
The bottoms considered equivalent to expense of horse for ploughing.	
	\$26 00
Profit,	
	\$11 10

2d.—Oats.

Ploughing twice, \$2 ; 2½ bs. seed, \$1 ; sowing, 50 cts.,	\$3 50
Reaping and gathering, \$1 50 ; carting, 50 cts.,	2 00
Interest on land, at \$40,	2 40
	\$7 90
Straw equivalent to expense of threshing.	
Twenty-five bs. oats, half price of corn, 50 cts.,	\$12 50
Profit,	\$4 60

Egremont.—Another estimate of expenses of corn crop without manure, but plastered.

Ploughing, \$2 ; planting, \$1 ; seed, 25 cts.,	\$3 25
Plaster, 1 bs. 30 cts.; hoeing three times, and horse, \$4,	4 30
Topping stalks, 50 cts.; picking and husking, \$2,	2 50
Interest on land, at \$40,	2 40
	\$12 45

Produce.

Thirty bushels corn, at 75 cts.,	\$22 50
Fodder,	3 50
	\$26 00
Profit on corn,	
	\$13 55

2. Expenses of an acre of Oats.

Ploughing and harrowing,	\$2 50
Two and one-half bushels seed,	1 25
Cradling and binding,	1 50

Getting in, 55 cents,	.	.	.	.	55
Threshing, at 4 cts.,	.	.	.	.	1 60
Interest on land, at \$40,	.	.	.	.	2 40
					\$9 80

Produce.

Forty bushels, at 50 cts.,	.	.	.	\$20 00
Straw, equivalent to threshing,	.	.	.	1 60
				\$21 60
Profit,	.	.	.	\$11 80

In Egremont, 700 bs. of rye were obtained on thirty-two acres of land.

Egremont has about 75 farms. On these farms, 500 bs. of oats are produced on an average to each. Several farmers raise 2000 bs. each. The wheat cultivation has been successful among them for the last ten years. They raise an ample supply of bread corn; and export considerable quantities.

In Great Barrington the rotation is corn on greensward; oats with clover; winter rye, and land laid down to grass.

Expenses of an acre of Indian Corn.

Ploughing 2, harrowing 1, seed 50,	.	.	.	3 50
30 loads manure spread, at 50 cts. half charged to the corn crop,	.	.	.	7 50
Planting 1 50, hoeing twice 4,	.	.	.	5 50
Gathering and husking 3 50, interest on land at 40,	.	.	.	5 90
2 40,	.	.	.	\$22 40

Corn fodder equal to one ton of hay,	8 00	
40 bushels corn at 75 cts. . . .	30 00	38 00
Profit, ...		15 60

2nd.—Oats.—Expenses of one acre.

Ploughing 2, harrowing 75, seed $2\frac{1}{2}$ bush. $93\frac{3}{4}$,	.	3 68 $\frac{3}{4}$
1 bush. plaster 50, gathering 1 75,	.	2 25
Interest on land at \$40, 2 40,	.	2 40
		8 33 $\frac{3}{4}$

Produce 40 bush. half price of corn, $37\frac{1}{2}$,	15 00	
Straw equivalent to the threshing,	.	15 00
Profit,	.	\$6 66 $\frac{1}{4}$

In other cases the expenses of an acre of corn without manure, but with plaster, at \$17 49. The corn at 30 bush. at 80 cts. \$24 00. The corn fodder at $\frac{1}{2}$ ton of hay, \$4 00. The profit in this case \$10 51.

Of oats, the expense at \$10 10—the crop 40 bush. at 40 cts., \$16 00—the profits \$5 90—the straw deemed equivalent to the threshing.

Great Barrington.—Another estimate of Indian Corn.

Ploughing 2 00,	2 00	
10 loads manure at 50 cts., half the manure only to be charged to the corn,	5 00	
Getting out and spreading manure 3 00, planting 1 50,	4 50	
Seed, 7 qts. 34 cts.,	34	
Hoeing twice on the intervale lands,	6 00	
Cutting up and stacking 2 00, husking 2 00,	4 00	
Interest on land at \$60,	3 60	
Product,	\$25 44	
35 bush. corn at 75 cts.,	26 25	
Fodder equivalent to one ton stock hay,	7 00	
	33 25	

Balance in favor of corn, \$7 81

In another case the yield of corn is ascertained on the whole farm to average 49 bush. Gross expense of cultivation without interest on land, 12 34. This is an actual account; the labor in this case, however, is not charged at \$1 00 per day, but at its actual cost. Yield of wheat on this farm 18 bush. to the acre. Expenses of cultivation \$11 00. Of oats ordinarily 50 bush.; and expenses of cultivation \$7 56. Of potatoes 320 $\frac{1}{2}$ bush. to the acre, and expenses of cultivation \$23 50.

In another case the yield and expenses are thus stated :

Yield per acre—Wheat,	12 bush.	Expenses,	\$11 88
Indian Corn,	59 “	“	30 69
Rye,	12½ “	“	5 10
Oats,	30 “	“	5 10
Pease and Oats,	30 “	“	6 35
Potatoes,	175 “	“	33 59
Ruta Baga,	750 “	“	50 06

In these cases it is presumed no rent is charged on the land. The last account is an actual return of the last year, when the extreme severity of the drought was unfavorable to large returns.

In Otis, two estimates were given.—Indian Corn, one acre.

Expenses.		Product	
Ploughing,	\$4 00	30 bush. corn	30 00
Manure, 8 loads,	3 00	Corn fodder,	3 00
Getting out manure,	2 00		
Planting 3 00, seed 25,	3 25		33 00
Hoeing twice,	6 00		23 05
Gathering and husking,	3 00		
Interest on land,	1 80	Profit,	\$9 95
			\$23 05

Estimate from another Farmer.

Expenses.		Product	
Ploughing 2 days,	\$5 00	50 bush. corn,	\$50 00
Manure 30 loads spread,		Corn fodder equal to	
half to the corn crop,	7 00	½ a ton of hay,	5 00
Getting out half 3 00,	3 00		
Planting 4 ft. by 3 ft.,	2 00		55 00
Hoeing three times,	6 00		
Gathering and husking,	5 00	Profit in favor of the	
Int. on land at \$30 pr. acre,	1 80	corn,	\$25 20
			\$29 80

In Stockbridge I give the exact expenses of cultivating six acres of corn in one instance.

Ploughing with oxen six days,	\$12 00
Harrowing 2 days with team,	4 00
Plaster, but no manure, 4 bush.,	2 00
Planting 3½ ft. by 4 ft.,	6 00
Furrowing, 2 00	2 00
Ploughing the field two furrows in a row each way, turned the furrows from the hill each time 4 ways,	8 00
Hoeing \$6, second ploughing \$8, second hoeing \$6,	20 00
Topping stocks and putting up \$5,	5 00
Gathering and husking ; 10 bush. made a day's work ; the whole field,	20 00
Interest on the land at \$30 per acre,	10 80
	\$69 80

Product of the above six acres.

Corn fodder equal to half ton of hay per acre,	\$24 00
200 bush. sound corn at 75 cts.,	150 00
Pumpkins 2 loads to an acre, worth more than \$1 per load if ripe ; excellent for pork and beef,	12 00

186 00

Balance in favor of crop,	\$96 00
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Stockbridge.—Expenses of an acre of Oats.

Ploughing \$1 50, harrowing \$1, seed 2 bush. 80 cts.,	\$3 30
Cradling and tying up \$1 50, getting in 50 cts.,	2 00
One bush. plaster 50 cts., rent of land at \$50, \$3,	3 50

\$8 80

45 bush. oats at 40 cts.,	18 00
Straw pays expense of threshing,	
Profits on crop,	\$9 20

Expenses of cultivating an acre of Ruta Baga.

Ploughing twice old land, ...	\$2 00
One pair of horses will plough 2 acres per day, 30 loads manure, half charged to this crop, ...	7 50
Getting out half the manure, 1½ day, ...	3 00
Ridging 50 cts., sowing with machine \$2, seed half bush. 50 cts., ...	3 00
3 ft. 3 inch. between the rows, plants in the row 1 ft. apart.	
Thinning out \$2, 2 days' weeding \$2, ...	4 00
Three hoeings 6 days \$6, gathering \$8, ...	14 00
Rent of land at \$40, ...	2 40
	\$35 90

Product.

Five hundred and fifty bs., worth one shilling for pork or beef, ...	91 66
Profits on the crop, ...	\$55 76

Estimated expenses of an acre of Potatoes.

Ploughing green-sward, ...	\$2 00
Harrowing 50 cts., seed 25 bush. \$6 25, ...	6 75
Manure 15 loads in the hill, half to this crop, ...	3 25
Planting and manuring \$6, ...	6 00
Ploughing \$1, one hoeing \$2, ...	3 00
Digging and storing \$9, ...	9 00
Rent of land, ...	2 40
	\$32 40

Product.

Two hundred and sixty bs. potatoes at 20 cts., ...	\$52 00
Profits on crop, ...	\$19 60

West Stockbridge.—Expenses of an acre of Corn.

Ploughing twice \$2 50, seed 5 qts. 25 cts., ...	\$2 75
8 loads manure in the hill, ¾ cord each 75 cts., half to the corn, ...	3 00

Getting out and applying manure, two men and team one day ; half to the corn, ...	1 50
Planting 3 ft. by 4 ft., ...	1 50
Ploughing and hoeing twice \$6, topping stocks 50 cts.,	6 50
Gathering 4 days \$4, cutting up butt stalks \$1, .	5 00
Interest on land at \$40, ...	2 40
	\$22 75

Product.

Stalks and fodder equal to half ton of hay, \$5 00	
40 bush. corn at \$1, ...	40 00
	\$45 00
Profits on corn, ...	\$22 25

Expenses of an acre of Oats.

Ploughing and harrowing, \$1 50 ; half the manure, \$4 50,	\$6 00
Seed, 2½ bs. at 42 cts., \$1 05 ; cradling and tying up, \$1,	2 05
Getting in, 50 cts.; interest on land, \$2 40, ...	2 90
	\$10 95

Product.

Forty bushels oats, at 42 cts., ...	16 80
Straw equivalent to threshing. Profits on oats, .	\$5 85

The rotation of crops in West Stockbridge is thus stated, on land well limed :

1. On a clover ley, winter wheat.
2. Wheat, 25 to 30 bs.
3. Corn, 40 bs., with manure.
4. Corn, without manure.
5. Either oats, rye, or wheat, at pleasure, and laid down to grass.

West Stockbridge produces oats enough for sale beyond their own wants to purchase all their bread. They make pork enough for their own consumption ; and generally produce a sufficiency of the substantial of life for their own consumption.

Lee.—Expenses of an acre of Corn.

Ploughing, \$2 ; harrowing, 50 cts. ; seed, 37½ cts. ; planting, \$2, ...	\$4 87½
Manure, 20 large loads—say, ½ cord each—50 cts. ; 5 cords to the corn crop, \$5 ; getting out half manure, \$1 50, ...	6 50
Three hoeings, \$6 ; cutting up and gathering, \$2 ; husking, \$3, ...	11 00
Interest on land, at \$40, ...	2 40
	\$24 77½

Product.

Fodder, equal to ¾ ton of hay, ...	\$5 00
Corn, 50 bs., at 75 cts., ...	37 50
Add 4 loads of pumpkins, ...	4 00
	\$46 50
Profits on corn, ...	\$21,72½

Expenses of an acre of Oats.

Ploughing, \$2 ; seed, 2½ bs., 94 cts., ...	\$2 94
Manure and getting out ; half belongs to the oat crop, ...	6 50
Threshing, \$1 50 ; Interest on land, \$2 40, ...	3 90
	\$13 34

Product.

Oats, 50 bs., at 37½ cts., ...	\$16 75
Eighty bundles straw, at 2 cts. per bundle, as sold at paper-mill, ...	1 60
	\$18 35
Profits on oat crop, ...	\$5 01

It seems bad economy to sell the straw at this rate. The manufacturer, perhaps, cannot afford to give more. The farmer cannot afford to take so little. The value of an acre of oat straw, yielding 50 bs. to the acre, even where manure is estimated as cheaply as above, cannot be overrated at four or five dollars. It is not to be recommended to sell it even for that.

Expenses of cultivating an acre of Potatoes.

Ploughing, \$2 ; seed, 20 bs., \$5 ; planting, \$3,	\$10 00
Ten loads manure in the hill, \$5 ; getting out manure, \$3,	8 00
Hoeing twice, \$5 ; digging, one-tenth to the crop, \$6 25,	11 25
Interest on land, at \$40,	2 40
	\$31 65

Product.

Two hundred and fifty bs., at 25 cts.,	\$62 50
Profits on the crop,	\$30 85

Expenses of an acre of Ruta Baga.

Ploughing, \$1 50 ; harrowing and ridging, \$1,	\$2 50
Manure, 40 loads,—20 charged to this crop,	10 00
Sowing, 50 cts.; seed, 50 cts.; thinning and hoeing, \$6,	7 00
Two next hoeings, \$6 ; gathering, \$8,	14 00
Rent of land,	2 40
	\$35 90
Seven hundred bs. ruta бага, at 20 cts.,	\$140 00
Profits on crop,	\$104 10

The value credited to the crop in this case will be regarded as high ; but I give the estimate of the farmers themselves, who report their cultivation.

Lenox.—Expenses of an acre of Indian Corn.

Ploughing green-sward, \$2 , seed, 25 cts.,	\$2 25
Twenty-five loads of manure, half to corn,	6 25
Getting out manure, \$3 12½ ; dragging, \$1 ; planting, \$2,	6 12½
First hoeing, \$3 50 ; second do, \$2 50 ; topping stalks,	
\$1,	7 00
Husking and gathering, \$3 ; getting in butts, \$1,	4 00
Interest on land, at \$40,	2 40
	\$28 02½

Product.

Corn fodder, equal to 1 ton of hay, . . .	\$9 00
Forty bs. corn, at 75 cts., . . .	30 00
	\$39 00
Profits on corn, . . .	\$10 97½

Oats.—Expenses of one acre.

Ploughing, \$1 50 ; seed, 2½ bs., \$1 12½ ; sowing, \$1, . . .	\$3 12½
Cradling and tying, \$1 50 ; team, 50, . . .	2 00
Half the manure of the corn crop, and half expense of getting out the manure, . . .	7 81
Interest on land, at \$40, . . .	2 40
	\$15 83½

Product.

Forty bs. oats, at 37½ cts, . . .	15 00
Straw an equivalent to threshing. . .	
Balance against the oats, . . .	83½

It is plain, in the above two cases, that the corn crop was underestimated for such cultivation ; and that the efficacy and value of such manuring are by no means exhausted by two crops.

It rests upon the most respectable and credible testimony, that in two instances in this town, 120 bs. of corn have been obtained upon an acre ; 37 bs. of spring wheat ; 40 bs. winter rye, and 80 bs. of oats to an acre. What has been done can be done ; and it is easy to see how inconsiderable is the increase of expense in obtaining such crops, compared with the superior value over the crops reported as above.

Expenses of an acre of Potatoes.

Ploughing, \$2 ; manuring, same as corn, \$9 37½, . . .	\$11 37½
Seed, 20 bs. \$5 ; hoeing, \$5 ; digging, \$10, . . .	20 00
Interest on land, at \$40, . . .	2 40
	\$33 77½

Product.

Two hundred and fifty bs., at 25 cts., . . .	\$62 50
Profits on potatoes, . . .	\$28 72½

I shall now proceed to give in detail an account of a wheat crop in Lenox, in 1837, by a farmer, whose uniform success in raising wheat is ample proof of his agricultural skill.

The extent of land sown was 2 acres 60½ rods ; the whole crop was 89 bs. 26 qts. On one of the two acres the crop amounted to 40 bs. 20 qts. The mode of cultivation pursued by this farmer is somewhat peculiar. I shall refer to it more fully in a subsequent part of my report. At present, I only say, that the land on which this crop was obtained, was the preceding year in corn ; and the corn crop planted on an inverted green-sward. Some of this field was manured in the hill ; and on some of it the manure was spread at the rate of twenty common cart-loads to the acre. There was not a remarkable difference between the appearance of that part of the corn crop manured in the hill, or that on which the manure was spread. A circumstance, to which the attention of farmers is particularly invited, is, that in cultivating the corn, in hoeing and harrowing, particular care was taken not to turn up or break the sod from the bottom. I shall now quote from the account given by this intelligent cultivator :

“About the 15th of April, the corn hills were split with the common harrow ; and ploughed once with great care. A thin coat of barn manure was spread. The manure was principally fresh horse-manure. After sowing and dragging, leached ashes were spread over that part of the field not manured. Six bushels of clean seed were sown, after having been prepared by soaking in brine from 24 to 48 hours, and rolled in finely slacked lime, care being taken to have as much as possible adhere to the kernel. Care was taken to cover the wheat sown before it became dry. After sowing, the ground was dragged (harrowed) every day for five or six days, alternately crossing the field in opposite directions. Dry light soils are greatly benefited by working them while the dew is on. Heavy soils, however, should be thoroughly warmed and dried, previously to working them. When the blade was up two or three inches, a good dressing of plaster was given.”

Entire expenses of cultivation.

1 day with one pair of horses, splitting hills,	.	.	\$2 00
½ “ “ “ dragging,	.	.	1 00
2 days' ploughing, at \$2,	.	.	4 00

6 bs. seed wheat, at \$3,	18 00
Preparing seed, 50 cts.; 1 peck salt, 25 cts.,	75
2 bs. lime, 68 cts.; labor in sowing, \$1,	1 68
3 days, man and team, harrowing the wheat,	6 00
2 men, 3 days, to cart and spread manure, team and cart,	9 00
24 loads of manure, at 50 cts.,	12 00
350 lbs. plaster, at \$13 per ton,	2 27
Sowing plaster, $\frac{1}{3}$ of a day,	34
2 hands, 3 days' reaping, \$6; board of hands, \$1 50,	7 50
3 days' work binding, \$3; board, 75 cts.,	3 75
Carting, 2 hands $1\frac{1}{2}$ day, and team, \$3 75; board, 75 cts.,	4 50
	\$72 79

The soil is, what is here called, a dark loam, strongly siliceous. The substratum is mica slate.

This farmer has been uniformly successful in obtaining good crops of wheat, unless when he has suffered from accidents, not connected with the cultivation, and not foreseen nor controllable by human sagacity or skill.

In Richmond, the expenses of cultivation are thus estimated :

One acre of Corn.

Ploughing, \$2; seed, 5 qts., 25 cts.,	\$2 25
15 loads manure, $\frac{1}{3}$ cord each, at 50 cts., \$7 50, half charged to the corn,	3 25
Getting out and spreading manure, 3 days, half charged,	1 50
Harrowing, $\frac{1}{2}$ day, \$1; planting, $2\frac{1}{2}$ feet each way, \$1,	2 00
Hoeing 3 times, \$3; and horse, \$1 50,	4 50
Topping stalks, \$1; gathering and husking, \$4,	5 00
1 bs. plaster, 50 cts.,	50
Interest on land, at \$40,	2 40
	\$21 40

Product.

Forty-five bushels, at 75 cts.,	\$33 75
Fodder, equal to $\frac{3}{4}$ ton of hay,	7 50
	41 25
Balance in favor of corn,	\$19 85

Expenses of an acre of Oats.

Ploughing and dragging \$2, 2½ bush. seed 94 cts.,	\$2 94
Half the cost of manure \$4 75, . . .	4 75
Cradling and binding \$1, getting in 50 cts., . .	1 50
Interest upon land at \$40.	2 40
Plaster 50 cts.—threshing paid by straw, . . .	50
	\$12 09

Product.

40 bush. at 37½ cts., ...	\$15 00
Balance in favor of the crop, ...	\$2 91

Expenses of an acre of Potatoes.

Ploughing \$2, seed (supposed) 15 bush \$3 75, .	\$5 75
Plaster 1½ bush. \$1 50, hoeing twice \$4, . . .	5 50
Gathering \$7, interest upon land \$2 40, . . .	9 40
	\$20 65

Product.

200 bush. at 25 cts., ...	\$50 00
	\$29 35

No manure is used in this case ; but it cannot be supposed that such crops can be often repeated without manure.

Expenses of an acre of Ruta Baga.

Ploughing three times \$6, ...	\$6 00
Manure 20 loads, half to this crop—getting out ma- nure \$3, ...	8 00
Hoeing once \$8, gathering \$11, interest on land \$2 40,	21 40
	\$35 40

Product.

400 bush. at 16⅔ cts., ...	\$66 66
Balance in favor of crop, ...	\$31 26

I have been much disappointed in not having received from the intelligent and enterprising farmers of Pittsfield, such estimates of the expenses of cultivation as I had expected.

One of the best farmers in the town and in the state, puts down the expense of cultivating an acre of wheat at \$9 ; of oats at \$8 ; of rye at \$7 ; of potatoes at \$28 ; of ruta бага at \$25. The items of expense are not given.

I subjoin from another enterprising cultivator, whose whole management in respect to cultivation and stock is entitled to high commendation, an exact account of a crop of ruta бага and flat turnips in 1837.

The charges for preparing, cultivating, gathering, and the product of 4 acres Ruta Baga and English Turnips, are as follows :

April 21 and 22—2 days man and horse-team first ploughing 2,	\$4 00
June 5 and 6—2 days man and horse-team, second ploughing 2,	4 00
“ 6 to 9—3 teams and 3 hands, 3 days each, making 9 days drawing on 64 loads manure, \$1 50,	13 50
“ 10—2 men spreading manure, \$1,	2 00
“ “ 1 day man and horse-team harrowing,	2 00
“ “ 1 day man and horse ridging,	1 50
“ “ 1 day man sowing,	1 00
“ “ 1½ lbs. seed, at the price I sold seed, \$1,	1 50
	\$29 50
July 5 and 6—8 days' labor hoeing and thinning, \$1,	\$8 00
“ 12 and 13—8 days' labor hoeing and thinning, \$1,	8 00
	\$16 00
Oct. 16 to 18—18 days' labor charged for gathering, and 3 teams each 3 days, drawing, at 75 cts.,	\$20 25
Cr. Deduct for tops, \$2 per acre,	8 00
	\$12 25
	\$57 75

The quantity gathered from 1st. and 2d. acres, 1600 bs.

3d. " 1080 "

4th. " 900 "

3580 bs.

less than 2 cts. per bs.

If the interest on land were charged at \$40

per acre, ... 9 60

and the manure at its value, (a compost

of muck and stable,) 32 00 41 60

\$99 35

The turnips would cost not far from $2\frac{3}{4}$ cts. per bs., \$98 45.

He adds, "from my own observation much depends on having the land for the turnip crop, as also all root crops, potatoes excepted, mellow; they ought to be hoed at least three times, and oftener if the crop will admit of it. My crop of 1836, was hoed three times in the month of July, the ground was kept light until the tops covered it."

I annex to this the statement of a crop of Ruta Baga in Great Barrington, from another farmer, whose agriculture shows his industry and skill.

The amount of land was 1 acre and 20 rods. The amount of product, well cleaned roots, was 46,495 lbs.

The land on which they were raised was green-sward, and ploughed the last days in April, 1837. It had had no manure for three years preceding; it then received a thorough harrowing; it remained until the first of June; then harrowed it again smooth; and drew on thirty loads short barn manure; principally the manure of sheep, which is deemed preferable to any other for this root; this was spread and harrowed until it was thoroughly incorporated with the soil; it was then with a plough thrown into ridges 24 inches apart. It was then sowed on the 24th of June, which was ten days after the proper season for sowing; when well out of the ground, they were plastered at the rate of one bushel to the acre; they were then ploughed and hoed twice. In cultivating them great care should be taken to have them stand 24 inches apart between the rows; and the plants 6 or 8 inches from each other in the rows.

The expense of cultivating this acre and 20 rods was as follows :

2 ploughings \$4, harrowing \$3, $\frac{3}{4}$ lb. of seed 75 cts.,	\$7 75
30 loads manure at $62\frac{1}{2}$ cts. per load,	18 75
Ridging 75 cts., planting 50 cts.,	1 25
3 ploughings before hoeing \$2, 6 hoeings \$12,	14 00
Gathering \$6,	6 00
	\$47 75

In another case this same farmer obtained from 90 rods of ground 605 bs. The expenses of cultivation were as follows :

2 ploughings \$1 50, harrowing \$1, ridging 34 cts.,	
planting 25 cts.,	\$3 09
Seed $37\frac{1}{2}$ cts., 3 hoeings \$5, gathering \$3 25, manure	
\$7 50,	16 12 $\frac{1}{2}$
	\$19 21 $\frac{1}{2}$

Whole weight of crop, 25,410 lbs.

In Alford the subjoined estimates were obtained :

Expenses of cultivating an acre of Corn.

Ploughing \$2, harrowing \$1, seed 25 cts., planting \$1,	\$4 25
Manure, 30 loads spread, 15 charged to corn, \$7 50,	7 50
Getting out manure \$3 50, hoeing twice \$3,	6 50
Gathering and husking \$4, interest on land at \$60,	
\$3 60	7 60
	\$25 85

Product.

Corn fodder equal to one ton of hay,	\$8 00
50 bs. corn at 75 cts.,	37 50
	\$45 50
Profits on corn,	\$19 75

Oats, one acre.

Ploughing \$1 50, harrowing \$1, $2\frac{1}{2}$ bs. seed \$1,	\$3 50
Cutting and binding \$1, getting in 50 cts., interest on	
land \$3 60,	5 10
Threshing paid for by straw.	
	\$8 60

Product.

40 bs. oats at 40 cts.,	16 00
	\$7 40

From Lanesboro' the subjoined return was obtained from a farmer whose whole establishment is a model of neat and exact husbandry ; in neatness and carefulness perhaps no where surpassed.

Ploughing \$2, seed $\frac{1}{2}$ bs. 50 cts.,	\$2 50
Manure, 20 cart-loads, $\frac{1}{3}$ of the cord to a load, 50 cts.,	
half to be charged to the corn,	5 00
Getting out manure \$3,	3 00
Planting 3 ft. square, \$1 50, hoeing 3 times \$7 50,	9 00
Cutting up and gathering \$2, husking \$2,	4 00
Interest on land at \$40,	2 40
	\$25 90

Product.

Corn fodder equal to 1 ton of hay,	\$9 00
50 bs. corn,	50 00
Pumpkins, 2 loads,	2 00
	61 00
Profits on corn,	\$35 10

This farmer is in the practice of occasionally planting potatoes among his corn. In this case he plants his corn 3 ft. 6 inch. apart in the rows, and a hill of potatoes between the hills of corn. In this way he frequently obtains 150 bs. potatoes upon an acre, and considers the crop of corn not much lessened on account of the potatoes. The injury to the corn is in this case rather a matter of judgment than of exact experiment ; and therefore this conclusion is in my mind to be somewhat distrusted. Corn and potatoes planted in alternate rows, or one row of corn and two of potatoes, have succeeded well ; and from two acres of corn and potatoes planted thus alternately, there is little doubt that more corn and more potatoes may be obtained than from two acres, where the corn and the potatoes are planted separately. In cases of alternate planting, the corn has a great advantage in its exposure to the sun and air. In the case above mentioned the potatoes occasioned a very small diminution of the number of hills of corn on the land. Here the potatoes, which require, particularly, coolness and moisture, obtained an advantage in being protected to a degree, from the drought, by the leaves of the corn. In all these cases, however, of mixed crops, and of multiplying plants upon the land, two things are to be remembered ; the first, that they are always of more difficult cultivation ; a potato crop

is kept clean with much more difficulty than a corn crop, and the corn crop with potatoes intermixed with it, is kept clean with much more difficulty than when cultivated alone. The second thing to be remembered is, that the preparation of the land must correspond with the amount of vegetation grown upon it ; and a great crop can be expected only from a soil abundantly enriched. The art of producing fire and warmth without fuel, or of sustaining either vegetable or animal life without nutriment, is not yet attained.

The expenses of cultivating an acre of oats, as given by the same farmer, are subjoined :

Ploughing and dragging \$2, seed 2½ bs. \$1 25,	\$3 25
Sowing 25 cts., half the manure and expense of getting out \$6 50,	6 75
Cradling and tying up \$1 50,	1 50
Interest on land at \$40,	2 40
	\$13 90

Product.

40 bs. of oats at 50 cts.,	\$20 00
Straw against expense of threshing.	
Profit on oat crop,	\$6 10

I shall add the return of another farmer, of the expenses of cultivating an acre of ruta бага :

Ploughing green-sward and dragging,	\$3 00
20 loads coarse manure at 50 cts., half to this crop,	5 00
Getting out with team, half the expense,	2 00
Drilling and sowing rows 24 inch. asunder,	50
Hoeing and weeding the first time,	3 00
Hoeing &c., second time \$3, gathering \$11,	14 00
Interest on land at \$45,	2 70
	\$30 20

Product.

900 bs. at 10 cts.,	\$90 00
	\$59 80

He subjoins the remark that ruta бага are in his opinion better for sheep than potatoes ; that his manure is spread on the surface and thoroughly harrowed in.

From Cheshire I have two estimates, which I subjoin :

Expenses of cultivating an acre of Corn.

Ploughing \$2, dragging \$1, ...	\$3 00
30 loads manure, half a cord to a load, $\frac{1}{3}$ to be charged to the corn, ...	5 00
Getting out manure \$1 25, ...	1 25
First hoeing \$2 25, second hoeing \$1 62 $\frac{1}{2}$, ...	3 87 $\frac{1}{2}$
Third hoeing \$1 25, topping stalks \$1 50, ...	2 75
Gathering and husking \$4, interest on land \$2 40, ...	6 40
	\$22 27 $\frac{1}{2}$

Product.

One acre of corn fodder equal to 1 ton of hay	\$9 00
40 bs. corn, ...	40 00
Profits on corn, ...	\$16 72 $\frac{1}{2}$

Expenses of an acre of Oats.

Ploughing, harrowing and sowing, ...	\$1 50
37 $\frac{1}{2}$ bs. seed \$1 75, cradling and gathering \$1 50, ...	3 25
Manure \$6 25, ...	6 25
Interest on land at \$40, ...	2 40
	\$13 40

Product.

Straw against threshing.	
40 bs. oats at 50 cts., ...	\$20 00
Balance in favor of oats, ...	\$5 60

I add the estimates of another farmer in Cheshire, who has had much and successful experience.

Expenses of an acre of Corn.

Ploughing green-sward, \$2; dragging, 50 cts., ...	\$2 50
20 loads manure, half to the corn, ...	5 00
Getting out manure, \$3; planting, 3 ft. square, \$1, ...	4 00
Seed, 5 qts., 25 cts.; hoeing, including horse, \$2 50, ...	2 75
2d hoeing, \$1 50; 3d hoeing, \$1 50; topping stalks, \$1, ...	4 00
Gathering and husking, \$3 50; interest on the land, \$2 70, ...	6 20
	\$24 45

Product.

Fodder, equal to one ton of hay, . . .	\$8 00	
40 bs. corn—sometimes have 60, . . .	40 00	
		\$48 00
		\$23 55

Expenses of an acre of Oats.

Ploughing and dragging, \$1 50 ; seed, 2½ bs., \$1 25, . . .	\$2 75
Manure, and getting out, ...	6 00
Cradling and harvesting, \$1 25 ; interest on land, \$2 70, . . .	3 95
	\$12 70

Product.

40 bs. oats, at 50 cts, ...	\$20 00
Straw against threshing.	
Had more than 45 bs. this year, 1838.	
Profits on the crop, ...	\$7 30

I have deemed it best thus at large to report the estimates of practical farmers in different parts of the county, as to the expenses of the cultivation of the different crops, which they are accustomed to raise. The price of labor, at a dollar per day, including board, is undoubtedly above its actual cost ; but it is better it should be so, than that a deceptive impression should be given as to the result by any under estimate of the expense. The estimates were procured sometimes from individual farmers ; at other times, at a meeting of farmers, where the estimates were corrected and determined, by being submitted to their united judgment. I only add, that the most earnest desire has been felt, and all possible pains taken to have these statements exact and true.

It will be remembered, that in the customary rotation of crops, as say, for example, Indian corn and oats, or potatoes, Indian corn and oats, or Indian corn, potatoes, and oats, the land is generally laid down to grass, and remains in grass from two to three or four years ; or in general, while it continues to yield a ton of hay to a cutting. In a rotation of corn, and oats, there is but one manured crop. Where Indian corn and potatoes precede oats, the land has usually two years' manurings. In the preceding estimates, it will be perceived that the

whole of the manure is charged to the cultivated crops, we mean cultivated in this case in distinction from grass crops. But it will be seen, at the same time, that the benefit of the manuring is felt in the grass as well as the grain crops. In order to judge of the profits of cultivation, it is proper to take into view the whole rotation,—say, of five or six years ; as, for example, corn, oats, grass three years ; or the following, which is an approved rotation : corn, oats with clover and plaster ; then wheat ; and grass three years. Now, what is the usual return of grass ? I have stated the amounts reported to me ; but I will here repeat them as given. In Pittsfield 1 and 2 tons to the acre. Sheffield, 2 tons, and $2\frac{1}{2}$ tons ; 4 acres yielded 12 tons ; 5 acres yielded 15 tons. West Stockbridge, 2 tons. In Stockbridge, from 60 acres of alluvial land a crop, averaging $2\frac{1}{2}$ tons of hay, has been repeatedly obtained. From 3 acres of land belonging to a highly intelligent and successful cultivator, whose lamented decease occurred the last summer, ten tons were obtained ; and this, too, from land redeemed from comparative worthlessness by his excellent management. Other reports give 2 tons to an acre ; one case an alluvial but cultivated meadow ; the other upon some of the high lands in this fertile town. In Egremont, $1\frac{1}{2}$ ton. In Lee, $1\frac{1}{2}$ ton. I might extend these returns, but it is not necessary. In estimating the returns of land, after obtaining the results of grain or cultivated crops, then add the grass of three years, averaging for the time, $1\frac{1}{2}$ ton to the acre. Deduct from these returns the cost of getting the hay, which is generally estimated at \$1 75 to \$2 per ton, and the interest of the value of the land. Suppose the return in hay to be $1\frac{1}{2}$ ton per acre, at \$8 per ton ; and in no part of Berkshire is it estimated at a lower rate ; the amount would be \$12. Then the cost of making the hay is \$3 ; and the interest upon the value of the land, at \$40 per acre, is \$2 40—leaving \$6 60 as the net return each year of the land in grass. This is a low estimate of the value of hay ; and a liberal charge for expenses. The hay, likewise, is presumed to be consumed on the place ; and there is, therefore, no loss of manure, as when the hay is sold from the farm.

The method of cultivation adopted by one farmer in Egremont deserves, perhaps, a particular notice. His farm consists of six hundred acres, three hundred and fifty of which are under improvement. The soil rests mainly on mica and argillaceous slate. The growth is

oak, walnut and chesnut, which, he says, will replace itself once in twenty years.

His average yield of crops is, corn, 25 30 bs., has raised 55 bs.; oats, 30 bs., weighing from 30 to 34 lbs.; winter rye, 20 bs.; winter wheat, 25 bs.; grass, 1 to 2½ tons.

His rotation is corn on green-sward, oats with clover, rye or wheat and the land stocked down to grass. He sows a peck of herds grass and clover, equally mixed, to an acre. But he uses no barn manure. He is accustomed to sow one bs. of plaster yearly, to an acre. He says he knows nothing of land becoming, as it is termed, plaster-sick. His crops are not large, but they are raised at a small comparative expense. This mode of management prevails in the neighboring district of New York, Columbia and Rennsellaer counties, where the whole country is agricultural, and in no part of the country is agriculture more successful. One farmer, for example, within ten miles of this farm, plants annually, in corn, 100 acres and raises upwards of 2500 bs. of corn. The operation of gypsum on these lands, which is obtained here prepared at about 10 dollars per ton, is singularly efficacious. But it is not the plaster alone that supplies the place of manure. It will be observed, that he turns under a large amount of vegetable nutriment, when he ploughs up his green-sward for corn; and when he ploughs in his oat-stubble charged with clover. This establishment on the side of the mountain, and near the turnpike-road leading from Sheffield to Hudson, is a fine example of highly productive and profitable agriculture.

4. TEASELS.—Of other crops raised in this county, the one that principally deserves attention, because the cultivation is not much known, is the Fuller's Teasel—(*Dipsacus Fullonum*.) This, in some few places, has been cultivated with eminent success. The burr produced on this plant is of great use in the manufacture of woollens, being employed to raise a nap on the cloth, that it may be prepared for the operation of the shears. Substitutes have been attempted in machinery made of steel; but there is an elasticity about the vegetable, which cannot be given to steel in this case; and the steel machinery is liable to tear the cloths. The amount of teasels consumed in the country is considerable, and is likely to increase. We have not, within reach, the means of determining the precise quantity.

There were imported into Boston,—

In 1835, 531 packages, amounting to	\$17,630
“ 1836, 362 “ “	10,450
“ 1837, 31 “ “	1,860
Total value,	\$30,040

This amount constitutes but a small portion of the whole consumption.

The teasels raised in this country are esteemed inferior to the best German teasels, and command a much lower price. A manufacturer of great experience, both in Europe and in this country, states, in a letter with which I have been favored, “that for a woollen factory the teeth must be full and strong; the color, *green-yellow*. When the teasel is yellow, it has been cut too late; and is consequently too ripe and not good. The core must be full; if empty or decayed, it is diseased. The kind denominated Rouaner is esteemed in Europe the best quality; they are far superior to those grown in Avignon in France. If the teasel is quite green, it is not good; as the teeth run all one way, and do not come back, as they have not had sufficient sun. If too yellow, they are too ripe, and their strength is lost; and the teeth break off and become useless, after being used three or four times; but the good ones, green-yellow, can be used twelve times on one side, then turned and used twelve times on the other side.”

I have the statements of three farmers familiar with the cultivation, whose estimates of the yield of an acre will be found to differ considerably from each other. This may arise from a difference in the cultivation, or in the assorting of the several qualities; perhaps the one includes more in what he deems marketable, than the other. Of the farmer who reports the smallest amount, I only say, that his crop was beautiful; and his teasels all assorted with the greatest care, being done up in separate bunches with neatness, and hung up separately to be dried.

He reports \$5,000 to an acre. Another reports from 200,000 to 300,000. A third, 250,000; and states, that on three acres he, in one instance, obtained a crop of one million. In one instance, 30,000 were raised on one-sixth of an acre; that is at the rate of 480,000 to an acre. The burr must be $1\frac{1}{2}$ inch in length, in order to be rendered merchantable. The manufacturer will buy those which are shorter,

but at an inferior price. The English divide them into three qualities : kings, middlings, and scrubs. The latter are saleable at a low rate.

They are a crop which requires two years to come to maturity ; and they are liable to be killed by the winter. The soil should be a deep, rich, moist loam. The cultivation should be as careful and thorough, as for any garden crop. The English speak of a clayey soil as being most favorable to this crop, and advise rather against high manuring. Our own cultivators are of a different opinion ; and say the ground cannot be made too rich. The crops with us are as large as the English crops ; but our cultivators often raise a crop of carrots between the rows of teasels.

The plants are sowed in rows, eighteen inches apart ; and the plants are thinned to a distance of four inches in the row. They are to be kept as clean as possible ; and in the spring every other row is to be taken up and the plants left a foot apart in the row ; those which are taken up may be transplanted. The transplanted roots are by no means so productive as those which remain where they were sown.

Teasels are deemed very good when they yield twenty burrs to a stalk ; fifteen is considered a good crop. A careful farmer in this county often gets fifty ; but his cultivation is very skilful. They are to be gathered soon after the blossoms fall and while green, excepting what are reserved for seed. An industrious man will cut six thousand per day ; ten thousand are sometimes cut, but it is an extraordinary day's work.

The teasels are liable to be killed by winter, or rather by thawing and freezing in the spring ; particularly from the snow-water freezing in the heart of the plant. The snow, therefore, in the spring, is to be carefully cleared away from the plant. The plants require to be protected in the winter by a covering of hemlock branches. Straw is often used ; but it is apt to become a harbor for mice, which destroy the plants. A farmer at Stockbridge recommends scattering some grain among the plants, to divert the vermin from the teasels. He gives it further, as his opinion, that the chance of success in the cultivation is seventy-five in a hundred. The price has fluctuated in a most extraordinary manner ; but it is not likely to be so variable while the intercourse with Europe remains free. They are very extensively cultivated there. As they are somewhat a rare crop with us, I have

been thus particular in describing the mode of cultivation. At present prices, \$1 50 per 1000, under good cultivation, they will afford a fair compensation. The kind of seed is of great importance, and I have accordingly imported a quantity of the best German seed for distribution among our farmers. The best article can be raised at as little expense as an inferior plant ; and the value of it in the market is much greater. It is to be said in favor of this crop, that the high manuring and clean cultivation which it requires, make it an excellent preparation for wheat. The crop, if well cured and managed, is of a durable character ; and the farmer, therefore, need not sacrifice his product through any unfavorable fluctuations in the market.

5. **FLAX.**—I recollect meeting with a few patches of flax. The crop on an excellent farm in Sheffield gives usually about 400 lbs. of flax, and 12 to 14 bs. of seed ; and it may be cultivated on the same land once in four or five years. Under such circumstances, it is deemed a profitable crop. Farmers have yet to learn the great value of flax-seed, made into jelly, in fattening cattle. No substance of the same bulk and expense within my knowledge, is so fattening for neat cattle and sheep.

III. DAIRY HUSBANDRY.

I proceed to speak now of another of the great interests of the agriculture of Berkshire,—the Dairy.

The dairy business has always been a great business. For a time it gave way to the raising of fine wool, when the prices of that staple were high. Since the abatement of the demand for wool, with that caprice for which mankind always have been, and there is reason to think always will be remarkable, many farmers have sacrificed their flocks ; and are now giving their exclusive attention to the dairy husbandry. These changes, in matters so important as the dairy or the sheep husbandry involving, as they do, a considerable investment of capital, and many expensive fixtures, cannot be suddenly or frequently made without risk of serious loss and disadvantage.

The county of Berkshire is admirably adapted to the dairy hus-

bandry. Grass is every where abundant. The soil is suited to the cultivation of esculent vegetables in the highest perfection. Several increasing manufacturing villages, with their swarming population, require supplies from the farms in the vicinity. Besides this, the great mart of the country, the city of New York, is easily accessible. Most of the farmers in Berkshire can reach Hudson with their produce, by a journey of four to eight hours, and put on board the boats at four o'clock p. m., it is in New York by an early hour the next morning. The farmer usually allows two cents a pound commission for the freight and sale of his butter; and, upon other produce, it is equally reasonable. He does not return from the river empty; but carries home a load of plaster, or of articles of necessity for his family. The great roads to the river, after the hills are surmounted, are among the best in the whole country. The rail-road, already open from Hudson to West Stockbridge, will afford to many of the farmers all the facilities they can desire for reaching the Hudson river.

PRODUCE AND EXPENSES.

1. *Egremont*.—I will, in this place, state, as an example, the operation of a farmer, who resided about twenty-five miles from Hudson. The great object of his attention was the making of butter, which was sold every week in the New York market.

From 18 cows he sold 2400 lbs. butter, at 23 cts. net. With these cows he fed 17 spring pigs until October, whose average weight was 177 lbs. each, half of this pork, say 88 lbs., was to be credited to the cow. He is of opinion, that when pork is \$10 per 100 lbs., a cow will give at least \$8 worth of pork per year.

Cow, Cr.

133 lbs. butter, at 23 cts., (comm. paid,) . . .	\$30 59
Pork, ...	8 00
	\$38 59

Cow, Dr.

Wintering, ...	\$12 00
Pasturing, ...	5 00
Salt, ...	25
Interest on \$25, 10 per cent. risks included, . . .	2 50
	\$19 75
Profits of a cow, ...	\$18 84

It is understood, that no extra feed is in this case given to the cow ; and the butter and milk used in the family, it is supposed, will fully pay for the attendance. This is a fair profit ; but it is, as I think, we shall presently see, much less than it should be. No animal is better entitled to good keeping than a cow ; because none makes a more liberal return for all the extra kindness and feed and attention bestowed on her.

In another dairy, nine cows made 1550 lbs. of butter, and 300 lbs. of cheese.

Another dairy of twenty cows produced,—of butter, 500 lbs. ; of new milk cheese, 4000 lbs.

In this town, two acres of land are deemed sufficient for pasturing a cow or fattening a steer. Twenty head of cattle, made up of cows and three year old steers, were fattened upon thirty acres of land.

The subject of dairy-produce is of such importance, that I shall give various returns and calculations. I omit names ; I should be glad to give them, and in a majority of cases it might not be disapproved ; but a fear of giving offence, or of being thought to take an improper liberty, or of interrupting that freedom of communication, which I wish should subsist between myself and the farmers, and which seems indispensable to the success of the survey, induces me to withhold them, save where permission has been explicitly granted, or the nature of the case renders it obviously proper. The statements, which I give, rest upon undoubted authority.

2. In *Otis*.—Twenty cows gave 5000 lbs. new milk cheese, for sale ; each averaging also 25 lbs of butter ; 600 lbs. of cheese were also used in the family.

Cow, Cr.,		
280 lbs. cheese, at 8 cts.,	.	\$22 40
25 “ butter, at 20 cts.,	.	5 00
Calf,	.	4 00
Pork, 26 lbs. at 6 cts.,	.	1 56
		\$32 96

Cow, Dr.

Wintering, ...	\$12 00	
Pasturing, ...	5 00	
Interest on cost of cow, \$15—10 per cent,	\$1 50	
Labor and attendance, ...	2 16	
		\$20 66
Balance in favor of cow,		\$12 24

3. *Lanesboro'*.—Sales from 12 cows :—cheese at 12 cts.; butter at 25 cts.; gross amount, \$600. No account in this case is made of supplies in the family.

4. *Sandisfield*.—The average yield of a cow in ordinary seasons is rated at 250 lbs. with common keeping. By extra keeping, the quantity is increased to 350 or 400 lbs. The quantity of butter in addition, to each cow is supposed to be from 40 to 50 lbs., where new milk cheese is made.

The amount of cheese made in Sandisfield, in 1837, was estimated by a most competent authority, at 300,000 lbs.

Another farmer, with a dairy of 15 cows, states the average product of a cow, if she raises her calf, at 250 lbs.; if otherwise, 300 lbs.; and 25 lbs. butter also, from each cow. Four hogs may be kept to 20 cows. In this way, weighing 100 lbs. in the spring, they will weigh 300 lbs. in the fall. 140 lbs. of pork is to be credited to 5 cows.

The cost of wintering a cow here, is rated at \$10; pasturage, \$4. A good dairy woman will take charge of thirty cows, with assistance in milking and in handling cheese. Her wages will be \$1 50 per week, with board.

5. In *Tyringham*, the average yield of a cow is reckoned at new milk cheese, 283 lbs., and butter at the same time, 57 lbs. A dairy of 28 cows gave 7912 lbs. new milk cheese, and 1600 lbs. butter. A large amount of pork was fatted on this farm; but it is difficult to say what portion of it is to be credited to the dairy.

6. In *Sheffield*, the average product of 28 cows was 394 lbs. new milk cheese, and 50 lbs. of butter each.

The product of a cow is thus stated by this excellent manager :

Cow, Cr.

400 lbs. new milk cheese, at 8 cts.,	\$32 00
Calf, (killed at 3 days old,)	1 00
50 lbs. butter, at 16 $\frac{2}{3}$.,	8 33
Whey and butter-milk, make one hundred lbs. pork,	8 00
	\$49 33

Supra, Dr.

Winter keeping,	\$12 00
One acre of land costing \$50 will pasture the cow,	3 50
Salt 25 cts., 3 bs. bran \$3,	3 25
Int. on the value of cow at \$25, 10 per ct.	2 50
Labor of milking, making butter, cheese, &c.,	4 00
	\$25 25

Balance in favor of the cow,	\$24 08
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The quantity of land estimated for pasturage in this case seems small. It must be small for a general rule ; another farmer in the same town assured me that he kept one yoke of oxen all the season, and one horse half the season, on two and a half acres of land, which he showed me. The land had been greatly benefited by plaster.

7. In *New Marlboro'*, the yield of a cow is estimated at 300 lbs. new milk cheese ; 4 hogs are kept to 20 cows ; 2 tons of hay are deemed requisite for a cow ; value of hay sold \$10 ; but if the farmer can realize \$6 per ton for it used on the place, he deems it better than to sell it. Eight to ten acres of land here, with the use of plaster, is deemed sufficient for the pasturage of four cows.

8. In *Great Barrington*, 9 cows produced 1900 lbs. new milk cheese and 800 lbs. butter. In another case from 8 cows were sold of butter 200 lbs., of new milk cheese 1225 lbs. In another case 5 cows through the season, and an additional cow half the season, from 1st. June to 10th Nov., produced 651 lbs. butter—and 200 lbs. new milk cheese. In this case the weekly returns were given. The same farmer says, that his cows will average one pound of butter per day through the season. He states his cow account thus :

Cow, Cr.

200 lbs. butter at 20 cts.,	\$40 00
Calf raised,	2 00
Buttermilk, and skim milk for pork, equal to all the care,	\$42 00

Supra. Dr.

Wintering, 2 tons of hay,	\$16 00
Pasturing, 25 cts. per week, 26 weeks,	6 50
Int. on cost of cow \$20 at 10 per ct.,	2 00
	\$24 50
Profits of a cow,	\$17 00

9. In *Alford*, the actual yield of a cow was as follows :

Butter, 240 lbs. sold.

Cheese 100 lbs. do., besides using what milk and butter were required by two persons. She had her own skimmed milk, but no meal or grain. She consumed, as ascertained, two tons of hay ; and her pasturage was 25 cts per week.

10. In *West Stockbridge* the report given is 300 lbs. new milk cheese to a cow ; \$40 are often obtained from a cow ; \$30 are deemed an average yield.

11. In *Stockbridge*, the proceeds of a dairy of twenty cows are thus given :

20 cows.	4000 lbs. new milk cheese sold at 9½ cts.,	\$380 00
	1000 lbs. skim milk, “ “ 6 “	60 00
	600 lbs. butter, “ “ 25 “	150 00
		\$590 00

This gives \$29 50 cts. to a cow.

No account is made in this case of the supplies of the family, nor of the amount of pork fattened, both which items would greatly have increased the result.

12. In *Lenox*, the return of a dairy of 15 cows, was of new milk cheese 1200 lbs. ; of butter 1800 lbs.

The return of another dairy is as follows :

10 cows produced of butter 1120 lbs. 8 oz., sold at	
18 cts.,	\$201 69
“ “ cheese, 800 lbs. sold at 9 cts.,	72 00
	\$273 69

13. *Tolland*.—From a highly intelligent farmer in a town adjoining the county, Tolland in Hampshire co., I received so particular an account of a dairy, that I shall here insert it, though it might be thought to come more properly under the report of another county.

15 cows produced 4500 lbs. cheese, sold at 9 cts.	
per lb.	\$405 00
and 509 lbs. butter sold at 19½ cts.	99 25
	\$504 25

Fifteen cows will nearly fatten 4 hogs, weighing in the spring 20 lbs. each ; in the fall, 240 lbs. each. In this case it is deemed proper to credit the milk with 140 lbs. weight of each of these swine ; 140 lbs. + 4 are equal to 560 lbs. pork at 8 cts. = \$44 80—this divided by 15 gives to each cow a credit of \$2 98⅔ cts.—

Butter and cheese 504 25, add pork 44 80=549 05.

The proceeds of each cow is \$36 60⅓—add calf and

rennet \$1 00, \$37 60⅓,	\$37 60⅓
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Expenses.

Wintering a cow, usual charge,	\$90 0
Pasturing do. \$6 50, salt 50 cts.,	7 00
Interest on the value of a cow \$23 at 10 per ct.	2 30
One woman will manage the milk of 30 cows,	
Her wages \$1 50 per week, 28 weeks, her board \$1 per week	
Wages and board for a dairy of 30 cows would be \$70,	
or \$2 33 each,	2 33
Additional help in milking and turning cheese 67 cts.,	67
	\$21 30
Profits of a cow,	\$15 30⅓

No account in this case was taken of the butter and milk used in the family ; but supposed to be not less than 150 lbs. of butter.

14. *Cheshire* is devoted almost exclusively to the dairy husbandry ; and has been celebrated for the excellence and abundance of its produce. For the goodness of their cheese, however, I must rely upon authority. Its appearance in some of the dairies, which I examined, bespoke careful, neat, and skillful management.

A farmer with 25 cows, states their average yield at 300 lbs. cheese, and 20 lbs. butter to a cow. He says likewise that 1500 lbs. pork are to be credited to his cows.

The average cost or value of his cows is \$30 each ; wintering \$14 ; pasturing 26 weeks, \$6 25 ; he raises some calves upon whey. It requires the whey of two or three cows to raise a calf. His hogs at 18 mos. average 350 lbs. ; they run in a pasture and have the refuse of the dairy until about six weeks before it is intended to kill them, when they are shut up and fed with corn and meal. A shrewd farmer observes, that, where swine in this way run in a pasture, it should be laid down as a rule, to have their trough always wet or always dry. This means that they should have as much whey as they are disposed to eat ; or, by being kept wholly without any, they should from necessity get their living in the pasture. They require quietness of mind and freedom from restless desires in order to thrive ; and they are like other epicureans whom variety and abundance render fastidious.

The dairy of another farmer consists of 20 cows. The year before last they yielded 400 lbs. new milk cheese ; the last year 400 lbs. each, besides an ample supply of butter for the family. He calculates upon the proportion of one hog to four cows ; with the above cows he made 1200 lbs. of pork, 600 lbs. of which he credits to the cows ; he deems 3 acres necessary for the pasturage of a cow. His cows during the spring, have an allowance of rye meal and whey.

In another case the produce of 23 cows was 12,000 lbs. new milk cheese, and 500 lbs. butter.

Another case from 11 cows including 4 three-year-old heifers, there were sold and used 3475 lbs. new milk cheese, and 403 lbs. butter. Three hogs were likewise fattened ; and it was considered that 400 lbs. pork were to be credited to the cows. Two tons of

hay were required for the wintering of a cow, valued at \$8 per ton ; or she might be kept for hire at 50 cts. per week.

In another case 30 cows made 14,000 lbs. new milk cheese ; and 500 lbs. butter. In this case some calves were raised ; but most of them were killed at four days old. Throughout the county of Berkshire this mode of dealing with the calves is termed " deaconing " them. What is the particular propriety of this provincialism, I am unable to determine ; and whether it had its origin in any superstition among the aborigines or the first settlers of the county, I shall leave to the antiquarians to ascertain. It is a peculiarity, and prevails nowhere else.

The practice, with this farmer, is to give boiled corn in the ear to his cows ; perhaps a dozen ears to a cow per day. When it is conveniently had, he gives a mess of rye meal to each cow, at the rate of two quarts per day, for three weeks in the spring. He is anxious to let his cows go to the grass as soon as the ground is bare. He thinks cows are liable to suffer from excessive feeding in the barn.

The wintering of a cow requires $1\frac{3}{4}$ ton of hay, . . .	\$14 00
Pasturing, 20 cts. per week for 26 weeks, . . .	5 20

In 40 days of the best of the season on this farm 30 cows produced 4000 lbs. butter. The land required for the pasturage of a cow is considered to be three acres.

From thirty cows, an average of 425 lbs. of cheese has been produced to each cow, and ten lbs. of butter ; or 300 the whole.

On one farm, where 18 cows were kept, 11,385 lbs. new milk cheese were made in a season, which gives the extraordinary average of $632\frac{1}{2}$ lbs. to a cow. 200 lbs. of butter were made the same season from the same cows. One of these cows produced 1000 lbs. new milk cheese.

During the first part of the season, for two months, two quarts of rye meal were given to each cow. Half of this quantity of meal was given them for one month during the last of the season ; and the greater part of the time they had their whey. 1000 lbs. pork were made on the farm ; and half of this was credited to the cows.

The same individual, when on another farm in South Adams, with twenty-one cows, made 626 lbs. new milk cheese to a cow, in a

season. 1700 lbs. of pork were raised in connexion with the dairy. Half the pork was considered due to the cows.

The process of making cheese began the 25th April, and ended the 1st December. As soon as the cows calved, the cows received 3 qts. of meal per day each—principally rye, with some Indian; and each had some whey, though not half what was yielded was given to them. Three or four of the cows received meal all the summer. He commenced feeding again with meal on the 25th July, and continued to give them two quarts of meal until the 25th of August. On the 25th of August, he began feeding the cows with corn-stalks until 10th September. Then the cows had the after feed of the fields; and from the 1st October, these cows had half a load of pumpkins per day. In November, fed every cow fully with meal; two and three quarts per day until 1st December. After that, the cows had nothing but hay until spring. From the same cows, at the same time, butter enough was made, and milk enough used, for a family of six persons. The cheese sold in New York for \$10 per 100 lbs.

These products are certainly remarkable, and show what may be done by attention, skill, and good treatment of the animals under our care. The pasturage in Cheshire is of an excellent description. The soil is generally of a rich gravelly loam resting upon limestone, and abounding in vegetable mould. It is likewise sensitive to the application of plaster, which is very commonly used.

IV. DAIRY STOCK.

The farmers are unanimous in their preference of the common native stock of the country, in which the Devon blood predominates, to any foreign stock with which they are acquainted. They are in general as decided in their preference of small, over large-sized cows. They are not, however, raisers of stock; and buy their cows wherever they can find them, according to their best judgment. The remarkable produce, if so it be considered, is to be attributed to extraordinary good management and keeping; and on this account, deserves the more attention, as showing what may be done.

The dairy stock in England which seems to have the preference over all others, is the Ayrshire. The origin of this stock is not well ascertained; but though it has some of the qualities of the improved Dur-

ham, it is a race distinct from that. Great pains have been taken and great expenses incurred, in order to introduce this fine Ayrshire race of cows into our state, by the Massachusetts Agricultural Society, and by an intelligent and public-spirited friend to agricultural improvement in Watertown. I regret that I am not able to obtain such returns as would enable me to speak confidently of the merits or defects of this stock, so far as these cases go ;—but I am safe in saying, that some slight disappointment has been experienced. It is probable, from the celebrity which they had obtained abroad, too much was expected from them here. Extravagant statements have been made respecting their produce in Scotland. One of the advocates for this stock, and a man upon whose authority great reliance is placed, has undertaken to calculate precisely the number of quarts of milk given, and the number of pounds of cheese made from what is stated to be in money the average produce of an Ayrshire cow. This is certainly rather a loose way of reaching the result. Entire reliance cannot be placed upon it. This, another distinguished Scotch farmer and dairyman admits ; and says that “those statements are far too high and not well founded.”

He refers to a farmer, on whose exactness he entirely relies ; whom he pronounces a man of superior intelligence and accuracy ; and who has devoted himself to dairy husbandry ; and, farther, whose stock were particularly select, and “who had every inducement to keep them in the highest condition requisite for giving the largest product in milk.” The farmer referred to, states, that at the best of the season the average milk from each cow is 9 Scots pints ($4\frac{1}{2}$ gallons), and in a year, 1300 Scots pints or 650 gallons. A Scots pint is two quarts. Now, allowing these cows to be in milk 320 days, the average yield of a cow would be $8\frac{1}{4}$ of a quart per day. But if we understand this to be wine measure, which is the usual standard of measurement in England, and compare it with our customary admeasurement of milk in Massachusetts, which is always beer measure, we must deduct one fifth ; and then the average product of an Ayrshire cow, compared with ours, is $6\frac{1}{2}$ qts. per day for 320 days. Such a yield is often surpassed by cows of our native stock. I have before me the case of a cow of native stock among us, who, in 268 days, yielded 2923 beer qts. of milk ; and of another, that produced 3975 beer qts. of milk in ten months. I can produce, within my own knowledge, a list

of nearly fifty cows of native stock, almost as productive as these. I do not mean to undervalue the imported stock. Far from it. I deem the introduction of the Ayrshire stock and the improved Durham short-horn, a great benefaction to the country. Their tendency to fatten, their early maturity, their beautiful proportions, highly commend them to our good will and our interests. As yet, we have not had, by any means, a sufficiently fair trial of their dairy properties so as to determine fully, either for or against them ; and it has been found here, in repeated instances, as it has proved abroad, that a cow, from a cross of an improved Durham, with the Devon, has given a valuable animal for the dairy. But among the great advantages which is to result from the introduction of this improved and beautiful stock, is this : to give our farmers a knowledge of what can be done by skill, intelligence, care, selection, and perseverance in the art of breeding animals for any purpose ; in obviating defects of form, constitution, and habit ; and in perpetuating and transmitting excellent and desirable properties. In the Ayrshire stock, and in the improved Short Horns, the most shrewd and persevering efforts have been exerted, and the highest practical skill and philosophy have been taxed to carry this race to as great a degree of perfection as any thing of the kind can be ; and the success has been decisive and wonderful. Excepting in one instance, to which I shall hereafter refer at large, perhaps there cannot be found in the whole of New England, a single instance of any enlightened, determined, and systematic attempt to form a race of animals of particular and desirable properties. It is most important that this should be attempted in different parts of our country, with what are called our native stock, who have become, in various ways, so crossed and mixed up, that there is in truth no particular race among them. A large portion of them are as ungainly, unthriftily, and unproductive as can well be represented or imagined. Yet there are among them so many extraordinary animals,—extraordinary for their produce in milk, butter and cheese,—that a few years of careful and intelligent selection from the materials already to our hand, and a strict observance of those philosophical principles of breeding which are well ascertained and understood, would undoubtedly give us a breed of animals, a stock or race of animals, greatly superior to that which now exists among us. This has been attempted in one instance by a highly intelligent breeder among us ; and he is now able

to show three generations of animals of as extraordinary character for the creamy or butyraceous quality of their milk, as has ever been known. Two quarts of what is called the strippings, the last part drawn off of the milk of one of these cows, having repeatedly produced one pound of butter ; and the cream, as it came from the pans, as I have seen myself, becoming by churning converted into butter of the finest description in less than one minute by the watch ; and this process repeated at pleasure.

Let us now compare the amount of cheese made by the English dairies, with some in this county of which I have here given an account.

An Ayrshire cow, it is said by the English authorities, will yield 257 lbs. butter per annum, or about 5 lbs. per week, all the year round, besides raising the calf ; or of new milk cheese, about 514 lbs. There returns are certainly large ; but they rest upon a calculation of the quantity of milk, which the cow is supposed to yield, rather than upon any account of an actual yield. None at least is given. This, therefore, is not so satisfactory as it would be, if it were a precisely ascertained result. One of the best authorities says, that in England, “ a well-fed cow of a good breed will produce, upon an average, 180 lbs. of butter in the season. The common calculation is indeed 150 lbs. ; but this is made upon mixed stock, which affords no certain data. In the Epping district, where there is an indiscriminate mixture of Devon, Suffolk, Leicester, Holderness, and Scotch, the calculation, in a well-managed dairy amounts to 212 lbs. ; that is, 6 lbs. per week during 26 weeks, and 4 lbs. per week, during 14 weeks. The average product of cheese in the best dairies, where the whole milk and cream are used, cannot be estimated at more than 4 cwt.—that is, 448 lbs. On deep grazing soils, that carry a heavy stock, a well-managed cow is reckoned to make from three hundred and sixty pounds to six hundred pounds. In Somersetshire, the average is $4\frac{1}{2}$ cwt., or 540 lbs. ; in Essex not so high, and in the midland counties something more than 3 cwt.” It will be seen, in looking back upon the dairy returns in some parts of this county, that they are inferior to these, not frequently passing beyond 250 or 300 lbs. of new milk cheese. On the other hand, the returns of some of the dairies in Cheshire show an actual amount of annual produce of more than 500 lbs. to a cow, and in some cases 627 and 632 lbs. It may be said,

that this is owing to the fine pasturage which is to be found in Cheshire and its vicinity ; to the particular care which is taken of the cows ; and the system of high feeding adopted. But it shows conclusively that the cows are capable of being brought to this productive yield ; and the feed and management are matters which can be adopted any where.

V. AMOUNT OF DAIRY PRODUCE.

This matter of the dairy is an affair of such great agricultural importance, that I deem it best to go more at large into it, though I must here refer to some facts, which properly belong to the report of other counties. To evince fully the importance of this interest I have been at pains to procure, with as much accuracy as possible in the case, the actual produce of this branch of husbandry in two or three towns, and here give it to the public. It will be understood, that this is independent of supplies of butter consumed in the families, of which no account was kept, and for which, therefore, nothing is credited.

The first is the account of the produce of the town of Cheshire, for 1838. The number of cows kept, the pounds of new milk cheese and skim milk cheese made and sold, the amount of cheese used, and the amount of butter sold are all given. I have the names of all the farmers, whose produce is here reported, but deem it most acceptable to these gentlemen to withhold them.

1. *Cheshire.*

DAIRY PRODUCE OF CHESHIRE, FOR THE YEAR 1837-8.

Farms.	Number Cows.	New Milk Cheese sold.	Skim Cheese.	Cheese used.	Butter sold	Farms.	Number Cows.	New Milk Cheese sold.	Skim Cheese.	Cheese used.	Butter sold.
1	14	lbs. 4500	lbs. 200	lbs. 150	lbs. 300	23	26	lbs. 7500	lbs. 200	lbs. 200	lbs. 700
2	20	6000	200	150	500	24	30	10,000	200	300	700
3	11	4000	100	100	200	25	18	4500	300	300	500
4	4	1000	.	100	200	26	18	5000	200	150	500
5	25	8000	300	150	300	27	25	9000	200	200	300
6	7	1500	.	300	300	28	10	2000	200	200	300
7	28	10,000	300	300	300	29	15	3500	200	150	400
8	10	4500	150	100	150	30	20	4000	500	500	300
9	14	4500	100	100	200	31	20	4500	300	200	500
10	30	15,000	500	150	500	32	28	9000	500	150	700
11	29	12,000	1000	300	1000	33	10	2500	.	500	500
12	15	4500	300	100	300	34	49	15,000	500	500	1000
13	30	14,000	500	200	500	35	10	2500	.	200	300
14	30	10,000	500	200	500	36	20	7000	500	200	500
15	7	2500	.	100	200	37	26	8000	300	200	500
16	20	8000	.	200	300	38	20	6000	300	200	500
17	20	7000	200	200	200	39	20	6000	300	200	500
18	14	3500	500	200	500	40	28	8000	300	200	500
19	10	3500	.	200	200	41	10	2500	200	150	200
20	30	11,000	500	300	500	42	28	9500	200	200	500
21	28	10,000	500	200	500	43	28	9500	200	200	500
22	18	6000	200	200	500	44	20	6500	200	200	300
						45	20	7000	200	200	500
	414	151,000	5050	4000	8150						
Average price for New Milk Cheese, 7½ cents.											
Do. Skim Cheese, 3 "											
Do. Butter, 17 "											
Total,						913	300,000	11,050	9500	19,050	

Average price for New Milk Cheese, 7½ cents.

Do. Skim Cheese, 3 "

Do. Butter, 17 "

The return from Cheshire the past season 1838-9 embraces only the principal dairies, as it was not in my power to obtain a more complete return. This gives 270,500 lbs. of cheese ; but there is no reason to suppose there has been any falling off.

2. *Peru.* The return I have from Peru of butter and cheese made for sale in that town in the season of 1838, is of cheese 30,000 lbs., of butter 13,000 lbs. The town of Peru has a population of 650, and its principal husbandry is the raising of wool.

3. *Sandisfield.* The quantity of cheese produced in Sandisfield in 1838, for sale is estimated at 300,000 lbs. Sandisfield has a population of 1493. From other towns in the county, though returns were promised, I have been unable to obtain any but such as are wholly conjectural.

A farm in South Adams last year produced more than 16,000 lbs. new milk cheese.

I hope it will not be deemed inconsistent with the proper gravity of my report, if I here refer particularly to an individual case of dairy farming in this vicinity, which much interested me, and holds out a beautiful and encouraging example of the success of industry, perseverance, frugality, and good management.

This farmer has now a dairy of 24 cows ; and they produce a cheese per day, weighing about 100 lbs. Supposing that it requires a gallon of milk to produce one pound of cheese, this would give 400 quarts of milk per day, or at the rate of 16 2-3 of a quart to a cow. These cows are all of native stock ; most of them raised by himself. His average product of new milk cheese to a cow in a season, is between 500 and 600 lbs. Last year the actual yield was 598 lbs. to a cow. Of his 24 cows last year, two were heifers of two years old, just come in. Four years since he was the owner of a cow, whose milk in the best season amounted by actual weight to 70 lbs. per day. During the time of her greatest yield, she was fed with four pails of cheese whey, and some rye meal. She was of native stock. This farmer has a heifer from her, which gives, as he supposes, 60 lbs. of milk per day. He gives an opinion, which from his successful experience certainly deserves attention ; that heifers which “ come in ” with their first calf at two years old, do better than when their coming in is delayed until three years old. Their milking properties are in this way improved. Probably he is right in this matter ; but the general

experience of the best farmers recommends that, if a heifer comes in at two years old, she should not be allowed to have another calf, under at least eighteen months from this time.

The establishment of this farmer is substantial and independent. As far as the common comforts of life are concerned, little more seems to be desired. Good air, good water, plenty of bread, plenty of fuel, plain and substantial clothing made by the hands of his own family, and the product in a great measure of their own flocks and fields; an estate which he can call his own with truth, because it has been purchased not by fraudulent speculation upon other people's earnings, but by the healthful toil of his own muscles and the sweat of his own brow; luxuriant pastures filled with those beneficent animals, who are nourished by his kindness, and settle their bills in the most honorable manner every night and morning; and a clean dairy room of ample dimensions and exemplary neatness, with its numerous shelves, loaded with the richest produce, and speaking as well for the in-door as the out-door management; these features combined in this picture, present one of those beautiful examples of rural independence, and the bountiful rewards, with which a kind Providence is pleased to crown industry, frugality, and good management, with which I am happy to say the County of Berkshire is every where sprinkled over, even on its high mountain summits, as well as on its fertile alluvions, and in its peaceful and secluded vallies. The independent proprietor of this establishment is now sixty-six years old. At the age of nineteen he was not the owner of a dollar. He now admits himself worth thirty thousand dollars; and all this, with the exception of less than fifteen hundred dollars, is the produce of his own farming industry, as he has never been engaged in any speculation whatever. A higher good than all this is found, in the fact which he added with an honest pride and an enviable pleasure, that he had brought up eight children in habits of honest industry; and not one of them had ever disgraced his parents.

The standard of dollars and cents is a very imperfect standard, by which to measure the prosperity of such a man. It is a prosperity which money cannot purchase, and money cannot measure. It is a prosperity flowing from deeper, purer, and more enduring sources; from a competency for the evening of life, earned by honest labor; a mind unembarrassed by the fear of want, and the vexatious ca-

prices of trade and speculation ; and a grateful sense of the kindness of that just and beneficent Providence, whose blessings have rendered his peaceful and unpretending labors successful.

VI. NEAT CATTLE.

Of the neat cattle of the county much might be said in praise. Yet they are of no particular denomination, but intermixed with many accidental varieties. The North Devon stock mainly prevails throughout New England. Different varieties have been introduced, and crosses have been made in some instances with obvious advantage ; but, as before remarked, intelligent, systematic, and persevering attempts at improvements in a breed, have not been made within my knowledge on any extensive scale in Massachusetts, save in one case, to which I shall presently refer more in detail.

1. EXTRAORDINARY COWS. I shall give an account of some remarkable animals which have been found among what are called our native cattle. It is not pretended that they constitute a distinct race or characterize a particular class of animals ; but they show at least what materials are within our reach, upon which to build a stock of high character.

A cow of Samuel D. Colt of Pittsfield, from 1st December to 27th April, 148 days, produced 193 lbs. of butter.

A cow owned by R. Campbell of Pittsfield, has yielded 26 beer quarts of milk per day.

A cow owned by Hosea Merrill, gave 30 beer quarts of milk per day.

A cow owned by D. Fenn of Stockbridge, 8 years old, produced in one week 12 lbs. 9 oz. butter. During the same time, 10 quarts of the milk were sold, and in addition cream and milk were used freely in the family.

A cow owned by Calvin Davis, 4 years old in the spring of 1838, in 172 days produced 225 lbs. butter, and fatted a calf. An accidental injury to the cow, prevented a continuance of making butter.

Two cows of Wm. Dewey, of Alford, in good season, averaged for a length of time, 14 pounds of butter each per week.

A cow belonging to the late Dr. Hyde, of Stockbridge, for some time produced fourteen pounds of butter per week.

Two cows in Vandeusenville, produced 14 lbs. of butter each per week.

A cow belonging to — Millard of Egremont, produced 14 lbs. of butter per week.

From two cows belonging to Russell Brown, in Cheshire, besides the free use of milk and cream in the family, 90 lbs. of butter were produced and sold in three weeks, and in four successive weeks 114 lbs.

A cow owned in Stockbridge, by Stephen Willard, produced as follows :

In 321 successive days 331 lbs. butter.			
" 284	"	" 293	"
" 306	"	" 318	"
911 days		942 lbs.	

"The above is exclusive of 25 lbs. made while fattening three calves." He adds "my method of keeping has been grass only, from spring to fall. In the fall I begin with pumpkins and potatoes, and feed moderately during the time she gives milk. An account has been kept for only three years ; but it would not vary much from the above, for the twelve seasons I have had her, except the present season she has been farrow." This cow is now eighteen years old, "and will calve again about the middle of February."

Two cows owned in Pittsfield, produced each 50 lbs. of milk per day ; and one other 32 lbs. at a milking.

A cow owned by Thomas Hodges, in North Adams, produced last year 425 lbs. of butter ; 400 lbs. of this amount were made in nine months. Her feed consisted of one quart of rye meal, and half a peck of potatoes per day ; and very good pasturing.

To this list I will add the case of another cow, in the neighboring county, whose product must be considered as quite extraordinary. She is owned by Joseph F. Upton, of Ashfield. Franklin Co.

From the first of April, 1837, to the middle of February, 1838, her product was 335 lbs. 15 oz. From the 9th of May, 1838 to

the 28th December, 1838, she had produced 303 lbs, 3 oz. of butter, and was still making at the rate of one pound per day.

The owner adds, "In the year 1837, I killed my calf at three days old, and gave my cow the skimmed milk through the summer. I commenced the first of October to feed on potatoes. I gave her about one peck per day boiled as long as she gave milk. In the year 1838, I fattened my calf and killed it at four weeks old. It weighed 75 lbs. She has had nothing but grass this year, until the first of October ; since then I have fed her with one peck of boiled potatoes per day. My cow is seven years old last spring." Her winter-keep at present, while giving milk is as much hay as she will eat, and one peck of boiled potatoes per day. These cows are all of native stock, without any admixture of foreign blood. The three cases of largest product certainly cannot be considered as examples of high feeding. It is extremely desirable that some skilful farmer, should by a judicious selection from such animals as these, endeavor to form an improved race for the dairy. I have already said that this has been attempted by one gentleman in the state.

Before I proceed to say what he has accomplished, I will mention an interesting fact, communicated to me by an observing farmer of Stockbridge. Thirty-two years since he became the possessor of a very productive cow ; and has continued the breed to this day. She has never produced a bad milker, and some of her descendants owned by other persons in the village do equal credit to their parentage. The yield of one of them, which came within my knowledge, is twenty quarts per day.

2. IMPROVEMENT AT TEN HILLS STOCK FARM ; Middlesex Co. The great improvement in dairy stock, to which I have referred, has taken place on the Ten Hills Stock Farm in Charlestown, near Boston, under the skilful and enterprising efforts of Samuel Jaques. This account might perhaps with more propriety come under the report of Middlesex ; but as intimately connected with dairy husbandry I shall give it here, even though I may be induced to repeat it in another form. Perhaps no man in New England or the country has more practical skill, or better judgment in relation to live stock than Mr. Jaques ; and his experience has been long ; and marked by careful and critical observation in those points to

which his attention has been particularly directed. I have the pleasure therefore of letting him speak for himself, suggesting only such observations as I may deem proper to be submitted. The great principles of breeding to an experienced and philosophic mind, are almost as well determined as the great principles of mechanics, chemistry, or any other branch of natural philosophy. The first and most undoubted of all principles is, that like produces like ; and farther, that good qualities and bad qualities are transmissible ; and as where two animals come together of peculiar merits, the good qualities are likely to be transmitted, so also where prominent defects or faults exist, these faults or defects are likely to descend and to become aggravated. This applies especially to breeding within the lines of consanguinity among all animals, the human not less than the brute races. It is therefore the great aim of the accomplished breeder, to make such a selection that the desirable qualities shall predominate on both sides ; and especially that animals having similar defects or bad properties, should not be suffered to mingle to the aggravation of these evils.

A distinguished statesman of Kentucky, as I learn from a private source, has given it as his opinion, that the milking properties of cows is much rather matter of accident than of breed ; and that we must despair of being able to continue and transmit this property with any confidence of success. With the highest respect for the agricultural skill and intelligence of that gentleman, I cannot accede to this opinion ; and it is directly contradicted by experiments made with the improved stocks in England and confirmed by several years' success. I know that it has become almost proverbial, that you cannot rely with certainty upon a good calf, because you breed from a good cow. But it is to be considered that few careful trials are made ; that the character of the sire from which we attempt to breed, if any thing, more important than that of the dam, is generally matter of indifference ; and we are unreasonable enough to expect a good calf, when we send our cows to any miserable runt that happens to be in our neighborhood ; that any substantial improvement of this nature, is seldom to be expected from a single cross, especially from animals, which are not themselves high bred, but merely if the expression be allowed, accidental individuals ; and that such improvement can only be expected by continued trials, and careful and successive experiments.

3. **CREAM-POT BREED.**—From an account of his enterprises and success, with which Mr. Jaques has favored me, I make the subjoined extracts :

“ It has been my object to effect such an improvment in milch cows as should produce the greatest quantity of rich milk, affording the largest quantity of butter. There is a greater difference in pecuniary profit between a good or a poor cow than among any other domestic animals. In some yards, there may be found those which will not produce more than three pounds per week, and others that would make nine, and all on the same keep. As we sometimes hear of cows, which have produced seventeen pounds of butter per week, and even more, it occurred to me to inquire why a breed or race could not be formed with the same valuable properties. This I have attempted ; and have carried it to the third generation, and I am confident of success. I have a cow, whose milk has produced nine pounds of the best butter in three days ; and this on grass feed only. This I call my *Cream-Pot* breed. I have bred my cream-pots with red or mahogany-colored hair, yellow noses, with mahogany-colored teats, yellow skin, silky and elastic to the touch. I have obtained the breed by the cross of a Durham short horned bull on a selected native cow with certain extraordinary points and properties, anxious to retain as much of the form of the Durham, as to ensure capacious udders and with the valuable property of affording rich milk. Though an admirer of the Durham short horns, I have not found them producing so rich milk nor making so much yellow butter as I could wish. The Durham race are round and straight in the barrel, full in the twist, and inclining to be thick in the thigh. I have wished for some improvement in the form of the bag. But I would premise, that whatever I may say in respect to breeding animals, I only desire to express my own private notions, without a wish to dictate to any one, from the experience I have had, which, I am sensible, is very limited. Generally, cows, which I have examined, giving the largest amount of the richest milk, have had capacious bags, full behind, extending far up into the twist and also well formed ; hanging moderately deep when full in milk, and after the milk is drawn, quite the reverse, for I would avoid a fleshy bag. My Cream-Pot breed are full in the body, drop deep in the flank, are not quite so straight in the belly, nor as full in the twist, nor as thick in the thigh ; but in other respects I wish them to approach the Durham as near as may be.

My Cream-Pot breed excel particularly in affording a great quantity of rich cream, and that cream capable of being formed into butter in a short time, and with little labor, leaving a small proportion of buttermilk. Their cream produces more than eighty per cent. of pure butter ; and it is not infrequent to form the cream into butter in one minute. It has been done in forty seconds.

“ I have a heifer designated as Betty Cream-Pot, one of the third generation, which produced her first calf at two and a half years old. Mr. Brown, my foreman, made the following experiment upon her milk, without my knowledge at the time. After milking, he took two quarts of her milk out of the pail, and having strained it into a pan, allowed it to stand twenty-four hours. Having then skimmed the cream into a bowl, he churned it with a table spoon ; and in one minute, by the clock, he formed the butter. It was then pressed and worked in the usual way, and amounted to half a pound of pure butter. After this the following practice was pursued for eight or ten weeks in succession. At each of four successive milkings, two quarts of the strippings were strained into a pan, making eight quarts in the whole. All was mixed together in the same pan, and then churned. The average time of churning did not exceed ten minutes ; in some instances the butter was formed in five minutes. After being properly worked over, it was weighed and never fell short of two pounds. The remainder of her milk was for family use, and, when set for cream, produced the usual quantity. These experiments were made on grass feed only. She did not give a large mess ; only about twelve quarts per day. I have forty cows and heifers, ten bulls and bull calves of different grades of this cream-pot breed, all bred and raised by myself. I keep my bulls, selected as breeders, until I have proof of the quality of their offspring. My old cream-pot bull is ten years old. My Don Cream-Pot, from which I am now breeding with some of my cows and heifers, is three years old.”

It will be seen, that Mr. Jaques speaks with all the enthusiasm of an amateur. I cannot endorse, certainly to their full extent, all his doctrines respecting the power of breeding at pleasure, any animals of any desired shape or color, and of forming them as a statuary would mould his plaster ; but the approaches, which a scientific and experienced breeder can make to such a power as this are very considerable, as all the improved races of animals show, whether among neat cattle, horses, sheep or swine.

The dam of this stock was a noble sized cow, raised in Groton, Mass.; but the owner there knew nothing particularly of her origin. She was sold to a gentleman by the name of Haskins, residing in Dorchester, about five miles from Boston; and her cream was of such extraordinary richness, that it would become separated into butter by the motion of the carriage in bringing it into the city. The stock owned by Mr. Jaques is descended from this cow by a cross with the improved Durham short horned bull Cœlebs, imported some years since into Boston by a gentleman of that city, and owned afterwards by Mr. Jaques. This bull was without a pedigree; but it is said there is good reason to believe, that he was a regular descendant from Mr. Collins's celebrated bull Comet. The bull now owned by Mr. Jaques is a son of his by the daughter of the Haskins cow, which was also the daughter of Cœlebs.

Mr. Jaques is entitled to great credit for his care and judicious selection in continuing and improving the stock. I have repeatedly seen the cream from these cows; and its yellowness and consistency are remarkable; and in company with several gentlemen of the Legislature, I saw a portion of it converted into butter with a spoon in one minute. The color of Mr. Jaques' stock is a deep red, a favorite color in New England. They are well formed and thrifty upon common feed; and, if they continue to display the extraordinary properties by which they are now distinguished, they promise to prove themselves, for dairy purposes, the most valuable race of animals ever known among us; and as remarkable as any of which we have any information. They have now reached the third generation; and maintain their high character.

From six cows taken promiscuously in a dairy of improved short horn stock, in England, with a view to test the quality of the milk, it was found that they gave in the following proportion of butter to one quart of milk:

No. 1, 3 oz. 6 dwts.

2, 1 " 6 "

3, 1 " 12 "

No. 4, 1 oz. 10 dwts.

5, 1 " 14 "

6, 1 " 6 "

These measures, it will be perceived, are given in Troy weight, of which it requires 175 lbs. to make 144 lbs. Avoirdupois. It is not stated, whether the quart was beer or wine measure; and it is there-

fore difficult to adjust the proportions. A variety of circumstances likewise would affect in some degree, the result, as whether the milk was taken at the beginning or the last part of the milking ; and how long the cows had been in milk from the time of calving ; and what was the kind of feed given them at the time of the experiment. Still, I have quoted the result, as under any circumstances, showing by comparison the extraordinary product of the cream-pot breed.

4. DAIRY AND SOILING IN WALTHAM, MIDDLESEX CO.—

There is another case of dairy management upon a small scale, which, though occurring in another county, and that not a grazing county, is of so remarkable a character, that it will be highly interesting in this connexion. The authority upon which it rests is unquestionable. It shows particularly what may be accomplished by proper management, in locations, which are comparatively unfavorable ; and by means within the reach of individuals, whose possessions may be very restricted.

In Waltham, Middlesex Co., a gentleman had four cows ; but not a rod of ground, which could be appropriated to pasturage. These animals were, therefore, never out of the barn or the barn-yard ; and were fed with grass mown for them ; with green corn fodder, which had been sown broadcast for this purpose ; and with about three pints of meal each per day. The amount of their produce was kept for thirteen weeks. Two of these animals were heifers of two years old, who had calves the same spring ; and the whole milk of one of them was taken by her calf during six weeks out of the thirteen. Some of the milk of the other was taken for family use, but the quantity not determined. Under these circumstances, these heifers could not be rated as equal to more than one cow of full age and milk. From this stock, however, thus circumstanced and fed, 389 lbs. of butter were made in the thirteen weeks. An additional pound would have given an average of thirty pounds a week for the whole time to a stock which must be in fairness set down as three cows only. This experiment was made in 1837.

5. RAISING CALVES.—These statements will, I hope, stimulate the farmers in all parts of the state, and particularly where the dairy husbandry is pursued, to attend more than they have done to the

selection and improvement of their neat stock. Small hopes can be entertained of this until farmers get into the habit of raising their own calves. The high prices, which all kinds of stock have maintained for the last two years, has induced many more farmers to do this than formerly. In my opinion it ought always to be done where the stock from which you propose to raise the calves, is worth continuing. This can be done in the interior at much less cost than is generally supposed, if suitable measures are taken to effect it in the best manner.

A farmer of my acquaintance, in the interior, raises all his calves from a large stock of cows. His cows are known to be of prime quality. His heifers are allowed to come in at two years old, and are then sold with their first calf generally for thirty-five dollars, which he deems a fair compensation for the expense of raising. His calves are raised mainly upon skim-milk and whey, until they can support themselves on hay and grass. His steers pay a proportional profit, when sold at three to four years old.

The English authorities say, that upon two cows calving at different times, seven calves may be fattened for the butcher in the course of the year. More than this may be done if the calves are to be reared for stock ; and if some little addition of meal or vegetables is added to their feed.

Mr. Jaques remarks, on the subject of raising calves, that " he generally lets them take a portion of milk from the cows for about three months, and prefers keeping them in the stall until they are about a year old, thinking that he gets better forms, rounder barrels, straighter backs, greater broadness on the loin and hips, by this management. Calves turned to grass at two and three months old, become pot-bellied, their backs bent, acquire a narrowness in the loins, and seldom get over the defect entirely."

I believe that it is decidedly better to raise them in the stall or yard the first season, as their feed is much more uniform, and their growth not interrupted by sudden changes. They soon learn to eat hay ; and carrots or potatoes cut fine for them will be found highly beneficial. In all cases, the calf should be taken from the cow as soon after his birth as the cow's udder is brought into good condition and her milk fit for use ; and then should be fed by hand. " In my opinion," says a highly intelligent farmer of Stock-

bridge, "calves raised for other purposes than veal, should be early weaned from the dam ; and nursed at least one year upon food, adapted to give firmness and expansion of muscle, rather than to fatten them." The observation of another farmer, a plain man, but one of the most observing and practical farmers in the state, is deserving of attention. "One of the most important points, says he, in the feeding of the calf, is to feed him well when the grass first fails in the fall by frost. If suffered to fall off then he does not recover, and suffers more by scanty food than other animals." I shall subjoin in the appendix a letter, with which I am honored, from an intelligent farmer of much experience in Braintree, on this subject of raising calves, which deserves particular attention.*

6. QUALITY AND MANAGEMENT OF DAIRY PRODUCE.—The quality of the dairy produce in Berkshire County perhaps deserves remark. Much of the butter is very good. I ate little however that could be pronounced of the very first quality. This is always a rarity and cannot be expected but with peculiar pains-taking. It is impossible to convince our people of this, excepting where they have sometimes tasted butter with that peculiar richness and deliciousness of flavor, which I know not how to describe, but by comparing it to the richness of the odour of a new blown rose, with all the dew drops glittering among its leaves. I have tasted such butter several times in Massachusetts ; and therefore am certain it can be made ; and I know that such butter would always command almost any price in the market. Something is in the cows. The milk of different cows is known to have very different tastes, and therefore it must have other different properties. Much is in the feed. It is well known that June butter, when the pastures are in all their luxuriance, and September butter, when the cows are turned upon the after-math, are generally of a superior quality to that made at other seasons. But I believe from the best observation I can make, it depends more than any thing else upon perfect cleanliness, a pure atmosphere in the milk-room ; and especially upon the freshness of the cream, being taken early from the milk, and churned soon after being taken off. The salting too is of much moment ; but the medicaments of saltpetre

* Appendix B.

and sugar, do not in my opinion improve the flavor, nor assist the keeping, of the butter. What is greatly wanted in Berkshire county is a spring house for keeping the milk. I do not recollect the occurrence of one ; but on account of the numerous streams with which the country is watered, and the chrystal springs which burst from the sides of all their beautiful mountains, no part of the country is more favorable to such establishments ; and in those parts of the county where the proximity to the Hudson furnishes immediate and ready access to the city market, the great consumer which is ready to absorb every thing that comes within its reach, a good butter dairy, where by means of a spring house for the milk, and plenty of ice for its transportation, the article might be sent to market in its best state, a good butter dairy would yield a handsome profit. For swine the buttermilk is probably worth twice as much as the whey of cheese. Of the cheese of Berkshire county it would be improper for me to speak ; as with me cheese is always contraband, and can under no pretence be admitted to the port of entry. Those who profess themselves judges, and men of taste in this matter, speak well of it ; and perhaps a better test of its goodness is to be found in the fact that it bears a good price in the market. It is sent to market in a very green state ; oftentimes when but three weeks old. The best English cheeses are not considered as ripe and marketable until two years old. The general rule of yankee thrift is, we believe, “to turn the penny quick ;” and to sell what you have to sell whenever there are to be found those, who are ready to buy it. This rule may produce the most money, but perhaps is not as likely to produce the best cheese. It is not however worth while in this world to dispute about tastes. Constitution, education, and habit make strange differences among us ; and when I found, as I did find, among the farmers in the neighborhood of Lowell, that by a class of customers in the city, their calves were spoken for as soon as dropt from the cow and the skin taken off ; and that by another class of customers, the *beastings*, that is the first drawings of the milk from the udder after parturition, were always bargained for beforehand, I was obliged to remember, without I hope a sacrilegious perversion, that “all flesh is grass ;” and have recourse to the old chemical philosophy, which resolves every thing into the four great elements, earth, air, fire, and water, only variously combined.

A great improvement is thought by some to have been made in capping the cheeses, as it is termed ; that is, as soon as they are taken from the press, covering them completely with cotton cloth sowed over them tightly ; or else drawn round the sides of the cheese and over the edges, leaving the centre partially exposed. Where the cheeses are covered entirely, the cloth itself is completely covered and saturated with the usual unguent of whey-butter and some simple and harmless coloring matter. The effect is to preserve the cheese against the attacks of flies ; and to render the daily turning of the cheeses not indispensably necessary ; besides preventing their spreading and cracking. It is said by some persons, that the cheese does not cure so perfectly in this way as when exposed ; and that the sale is not so ready. Such contradictory statements are made in this case, however, by those who have tried, and those who refuse to try it, that I cannot decide on its expediency. It impressed me favorably.

I found in use, in Sandisfield, a cheese-shelf of a simple construction, and suspended on a horizontal centre bar, in such a manner that many cheeses can be turned upon it by a boy, and at one operation. Bars are so placed that, in turning, the cheeses are prevented from falling out. The shelves are moveable, and those which have been used can be easily taken out and thoroughly cleaned and dried, until by another revolution of the shelves, they are wanted in their places. This is a cheap construction ; of great convenience ; and so useful, that I shall give a full description of it in the appendix.*

I have much pleasure in saying, that many of the Berkshire dairies are most exemplary in respect to neatness ; and in this matter present beautiful models of domestic management. There are exceptions, however, to this commendation. In some instances there is any thing but neatness. The sink and the pig-stye with all their offensive exhalations, on account of what is called convenience, which is only an apology, in such cases, for gross laziness, are in much too intimate proximity with the dairy-room ; and there are cases,—I shall not venture to say whether I saw them, or only heard of them—where, if the pigs should perchance mistake their own apartment and go into the next door, they would never suspect their error, un-

*Appendix C

less they were ordered out. Admonition, however, seems lost upon such persons. Slovenliness and sluttishness are incorrigible vices ; and the fate of such persons seems, as it were, in despair of reformation, irrevocably pronounced.

VII. SWINE.

Of the swine of Berkshire county, there is little remarkable. I met repeatedly with a breed called the Mocho breed, which are much esteemed. I have found them in different parts of the state, but I can obtain no account of their origin. The Berkshire breed from England has been introduced into the county ; and will extend itself as soon as its merits are properly appreciated. It is the best hog that we have among us ; and when used as a cross with some of our small boned breed, such as the Byfield or the China, or the Mocho, the progeny is highly approved. In a cross with the grass breed, so common in New York, the produce is very fine. Beautiful samples of this cross have been produced on one of the best managed farms in Massachusetts, in Lexington, near Boston. The average size, at eleven and twelve months old, has been 300 to 350 lbs. ; and with extraordinary care and feed they have been made to exceed 400 lbs. at ten months old. This early ripeness, in all animals designed for the butcher, is of great importance.

On the dairy farms, the raising of pork is extensively pursued, excepting where the whey itself is used for the cows. The expediency of using the whey for the cows or in preference of keeping swine, is a vexed question among the farmers, which I have no means of determining. One hog is usually kept to four cows. A shoat, weighing seventy pounds in the spring, kept upon the slops of the dairy and pasturage, and some meal or potatoes or both, may be expected, in the fall, to weigh 250 lbs. ; and the farmers in general consider more than one hundred pounds of this produce as in justice to be credited to the four cows. This, I believe, is in most cases an underestimate. No article can be given to swine, so conducive to thrift as milk, or the slops of the dairy.

One of the best establishments for fattening swine I found in Great

Barrington. This farmer, whose whole management is excellent, fattened, the year before the last, twenty-four large hogs. The current year he has fattened twenty-five, and their average weight was 318 lbs.; total 7,950 lbs. His mode of fattening swine deserves attention. "As soon as the pastures will afford a good bite of grass, he turns them in where they can have plenty of clover and water. He is careful to salt them once a week, or oftener, if the season is wet; and changes them from one pasture to another, as he does sheep or other stock, which is of much importance through the summer. As soon as he gathers his harvest, he gives them the stubbles. When these are well gleaned, he gives them corn cut up by the ground for a few days, as it is dangerous to keep them closely shut up and feed them highly in the beginning; having no exercise, it tends to produce the blind staggers. In order to remedy this, they must be put upon thin feed and have as much salt as they will eat. He commences steaming potatoes for his hogs the first of October, his ruta bagas not being then matured; he mashes them fine; puts nothing with them but the sour milk from six cows, and four quarts of salt to a box of twenty-eight bushels. This feed he continues three weeks. Afterwards, he commences steaming ruta бага, and continues this feed until the first of December, which is five weeks. He puts with the ruta бага, after being mashed fine, four quarts of salt and three bushels of oats and pease ground together, into a box containing twenty-eight bushels. On this feed they do extremely well. This feed he continues until the 25th of December; and then finishes off with meal and corn." The free use of salt is unquestionably of much advantage.

A very successful fattener of swine in another county, whose authority in this matter is decisive, is in the habit of boiling corn in a large vessel and with the mixture putting in a few quarts of wood ashes. The proportions, I cannot exactly ascertain; but he considers its use once a day of great benefit to the health and appetite of his swine. He is careful likewise to put charcoal into their styes once a week. A finer stock of swine or a finer display of fattening swine I have never seen than I have seen at this farmer's place, which is certainly a conclusive test of the excellence of his management.

I have statements without number of the value of apples for feeding swine. In one case the gain upon raw apples was eleven pounds weight in twelve days; and in this case nothing excepting apples

was used. The best form of using them seems to be to boil them with potatoes ; and it is recommended by several farmers in this case to put the apples at the bottom of the kettle ; and the potatoes become thus impregnated with their flavor. This comparatively new use and value of apples may be pronounced a great discovery of the most beneficial character. Many farmers not accustomed to speak lightly pronounce them of equal value as potatoes for the fattening of swine, for milch cows, and for beef cattle. I can answer for the human animal. There is no food more healthful or more nutritious in reasonable quantities than apples cooked or raw. A dish of baked apples and pure milk is of all others the most delicious to the undiluted taste ; and the free use of apples and milk, in place of the miserable slops of tea and coffee, would give to the young bipeds of the family vigorous bodies and bright minds ; abate a large item in domestic expenses ; and prevent a taste for the two greatest and unalleviated curses with which humanity was ever visited, tobacco and rum.

I had intended in this case to have gone largely into the subject of the sheep husbandry, one of the most important interests of this county and of the state ; but I have determined to omit it here and treat it at large in my Report of Franklin County which will immediately follow this ; a county which like Berkshire is well suited to the raising of wool.

VIII. MANURES.

It must be admitted that little attention is paid to the subject of manures ; and that a compost heap is scarcely to be found from one end of the county to the other. The usual resources are ample ; but the raising of wool has in many cases prevented cultivation ; and the forming or accumulation of manures has therefore received comparatively little attention.

The mineral manures in the county are abundant ; for an account of which I must refer to the elaborate report of the Geological Surveyor on economical geology, published by order of the government the last year.

Gypsum is obtained abundantly at Hudson. It costs there about eight dollars per ton ; and can be delivered in most of the western towns in the county, in a prepared state at less than ten dollars. It is applied to grass land and pasturage at the rate of a bushel to an acre ; and in almost all cases with eminent success. Its effects are more observable on soils based on lime-stone and full of rich vegetable mould ; but it is of little efficacy on wet or gravelly soils.

A farmer of Pittsfield of great intelligence and experience, and whose successful husbandry is universally admitted, speaks strongly of the value of plaster when applied to grass in conjunction with manure. His own words are " spread the manure and then spread one and a half bushel of plaster on the manure. The effect is very great compared with the result when applied without manure." Two acres, which yielded only a single load, after this application produced two tons of hay to the acre.

A farmer in Stockbridge, speaks strongly of the great value of gypsum, when applied on fields which have been thoroughly manured by the folding of sheep upon them. It may be said this is the effect of the manure and not the plaster. His own careful observation leads to a different conclusion ; and he is of opinion that great benefit results from the combination. This is in conformity with the theory of Dr. Dana, and Professor Hitchcock in respect to the operation of lime in any of its forms.

The same farmer gives an account of an experiment of plaster applied to potatoes, by putting a table spoonful on the seed in the hill. One quarter of an acre thus managed yielded as much produce as half an acre not plastered in its immediate vicinity. These effects of gypsum, in respect to grass and cultivated crops, are confirmed by the experience of two farmers in his immediate vicinity, as intelligent and practical as are to be found in the state.

In Otis, ashes on moist land has proved unfavorable ; and repeated, has occasioned moss and barrenness. On dry lands its effects have been most beneficial. My business is with facts ; and on such a subject who can presume to speak with confidence ? As the ashes applied to wet land becomes immediately dissolved and active is it not the case that the vegetable is furnished in quantities, which the plants cannot take up, being filled to repletion ; or passes off in its dissolved state immediately into the sub-soil ?

In Sandisfield, a farmer whose premises and stock, bespeak skillful and excellent management, and whose fellow citizens have deemed him year after year, well qualified to assist in the management of the state farm, has found plaster applied alone of doubtful utility ; but plaster applied with manure highly beneficial. Ashes and lime intermixed with manure have proved very beneficial to pasture lands. Leached ashes have been applied with great success to land, which the year previous has been in potatoes and manured for that crop.

Two of the best grain farmers in the county in Sheffield, mix plaster with their manure to great advantage ; and are in the habit of applying ashes in the spring upon their winter grain. They plaster their corn on the hill twice in the season.

A farmer in Sheffield, whose husbandry is admirable, uses plaster to great advantage on all his crops ; and deems it of much importance that it should be applied early and just as the crops are coming out of the ground.

The marls found in the county have not as yet proved as efficacious as was expected. They have been tried upon potatoes, corn, and wheat, but with indifferent success. Some disappointment at first was not surprising both from inexperience in the mode of application ; and because from the nature of the substance a permanent rather than a sudden improvement was expected.

A farmer of Lee, whose observations are careful and intelligent, made various experiments with this substance. The marl, to which he had access, contained of soluble geine 2.6 of insoluble, 3.4 of phosphate of lime, 1.2 of carbonate of lime, 86.2 of granitic sand, 5.0 of water of absorption 1.6. The land to which it was applied was a rich gravelly loam. Of potatoes six rows through the whole piece were marled in the hill ; a shovel full in each hill. The rows above them were not manured. The rows below them were manured with barn manure. The first part of the season he considered the marled rows as decidedly the best. In August, when I went into the field, they were not so promising as those manured with barn manure ; and were not upon the whole better than those by the side of them without manure. He writes me since the harvest, "that he cannot say that he has seen as yet much benefit from his marl, though his potatoes were somewhat better for the use of it."

A considerable dressing of marl on grass ground on the same farm produced no perceptible results.

Its effects on his corn were not ascertainable as the whole field was marled equally. The growth was luxuriant and promising ; but, whether from the operation of the marl or the fineness of the season, he could not determine.

At Sheffield, on a small farm which exhibits a beautiful example of intelligent and successful husbandry, upon a soil strongly siliceous but abounding in vegetable mould, and based upon lime stone, marl was applied for the wheat crop. It was applied through the field in strips, and at the rate of 500 bushels to the acre. After the most careful examination that could be given to it before harvest, comparing the marled portions with the adjoining, which were not marled, we were unable to perceive any advantage or effect from its application. The result at harvest showed no difference.

The testimony every where is unanimous in favor of wood ashes, applied to cultivated crops, excepting on new land where it is not needed ; to wheat in particular. An extensive manufacturer of Pittsfield, states that “ he has tried for several years with great success, the ashes from his iron furnace ; the ashes of bituminous coal and wood charcoal ; and found it of great advantage without any other manure. Agricultural chemistry has yet a great work before it, in the solution of these recondite operations.*

A farmer in Stockbridge speaks in strong terms of the beneficial effects of powdered lime-stone wherever it has been applied. At the mill for sawing and planing marble by a very ingenious machinery, much of this material is found reduced to a very fine powder.

IX. FARM BUILDINGS.

The buildings in the county are almost universally of wood. The best of building stone abounds ; yet I recollect but a single stone house in the county ; and to this, reference is had in my first report, page 121. Here it is stated that the contract for the erection of a

* Appendix D.

stone house was somewhat less than that of wood ; and in other respects it is greatly to be preferred.

I recollect a single instance only of a convenient barn cellar for the deposit of the manure ; and its protection from the exhausting and evaporating process of sun and air and rain. This is a most important improvement yet to be made ; but it is certain the value of manure is not half appreciated in this county. The broken character of the land throughout the county, affords every where the finest locations for this object ; and if in addition to providing for a location where a good cellar could be made under the barn, the building should be so placed that the barn floor could be laid upon the beams, and the drive-way be into the end directly under the roof, there would be an immense saving of room, labor, and fatigue. In that case all the hay and grain would be pitched *down* instead of *up* ; and great despatch secured ; which, in capricious hay-weather, is sometimes of great importance. The severe labor and excessive heat commonly attendant upon pitching off and storing away hay in our common barns would be also much alleviated. Two barns in Worcester county, erected by those careful and excellent husbandmen, the Shakers, are upon this plan, and greatly approved for their convenience. I am promised a precise account of their dimensions and arrangement, which I hope to be able to lay before the public in my report of that county. They combine many advantages ; and are an improvement upon the Pennsylvania barns, where the drive-way and entrance is usually in the second story ; and the passage way is formed by an abutment on the outside, presenting an ascent at an easy angle. In Lanesboro', in one of the neatest establishments which I ever witnessed, there was a little contrivance connected with the doors, the convenience of which was admirable. The doors were none of them swung upon hinges ; but run upon small wheels, and were made to slide in by the side of the wall. These wheels or trucks were attached to the upper end of the door by a small wooden ledge, by which the door was suspended. The door when opened was entirely out of the way. It could be opened a greater or a less distance at pleasure. There was no groove at bottom to become filled up with dirt, and obstruct the opening of the door ; and there was no occasion of clearing away any snow or other accidental obstruction from other matters, which

might be accumulated in front, in order to open it. There were also none of the usual troubles of the door being lifted from its hinges or being slammed or broken by the wind. It is a small affair but accomplished much convenience ; and is of a piece with every other part of this neat and exact establishment.

Of the remarkable barn of a circular form, at the Shaker's village at Hancock, I shall speak more particularly in another place. It is three stories in height, and the entrance is upon the second floor. It is ninety-six feet in diameter. The building is of stone, and of the most substantial and careful workmanship, like every other production of this remarkable community. It is a form of building which involves a considerable loss of room, and too expensive for the adoption of common farmers.

X. SHAKERS' ESTABLISHMENTS.

In a survey of the Agriculture of Berkshire, it would be inexcusable to pass over these establishments.

1. The Family at Tyringham consists ordinarily of one hundred members. The farm is understood to contain more than one thousand acres, principally situated on the side of a high hill, and running down into the valley, where it is crossed by the small stream called Hop brook, which empties into the Housatonic river at South Lee. The view from this eminence, as the prospect extends towards the northwest, embracing the village of Lenox, "set upon a hill," with the whole intervening valley of a diversified aspect and luxuriant soil, the little manufacturing bee-hive of South Lee, and the many rich summits every where scattered in the background of the picture, their tops and sides fringed with the chesnut and the rock maple, and the noble pile of Saddle-Mountain lying in the distant perspective like a contemplative giant in his repose, is among the most beautiful of those enchanting views, which are constantly opening upon the traveller, in this picturesque region.

The principal object of their farming, at Tyringham, is the raising of stock ; neat cattle especially. Their dairy is well managed ; and

they have a garden of four or five acres, devoted to the raising of garden seeds and medicinal herbs, under skilful and successful cultivation. Their annual sales have sometimes amounted to \$3,100 ; and they allow to their agents twenty-five per cent. commission on sales, and take back what is unsold. They produce some wheat, corn, and oats ; and they are now effecting with great labor and admirable skill the redemption of extensive alluvial meadows on Hopbrook, by draining, rooting out the stumps, and cultivating the soil, which will bring these lands under a course of most productive improvement.

Of the religion of this peculiar people, it is not for me in this place to speak. A religion which holds the severest restraint over appetites and passions ever liable by their excesses to lead men astray, which encourages industry, frugality, mutual love and kindness, and that which is certainly not lowest in the scale of virtues, the most exemplary neatness and order in every thing, is so far entitled to respect and commendation. Under whatever aspect we view it, we have at least occasion to congratulate ourselves, that we live under a government tolerant to every honest difference of worship and opinion ; and to remember, that the same principle, which secures freedom to ourselves, should guarantee to others a like boon.

2. The establishment of the brethren at Pittsfield and Hancock, consists of about seven hundred acres, lying together ; and is possessed by three large families, containing upwards of three hundred individuals. They are united for all the general purposes of their society ; but in their financial concerns are as families separate from each other. The land is not of the best description, being low, cold and wet ; and their attention is mainly directed to the cultivation of grass and garden seeds, and the keeping of cows and sheep. Their first purpose is for their own supply. They raise the best they can, and they eat the best they raise ; and though from their temperate and careful habits their thrift is remarkable, yet the accumulation of property is evidently not a principal object with them. They have various mechanical contrivances by which their labor is abridged or lightened. They have made the best use of the water power which their place furnishes, and husband it with care and economy. They have an extensive saw-mill carried by water, and all their fuel is cut

in the same way. A simple arrangement which it may appear trifling to mention, impressed me by its shrewdness and good judgment. Ordinarily, fire wood is piled horizontally, and when exposed to the weather, becomes water soaked and mouldy. Their billets of wood being sawed were stacked up in convenient piles, the sticks being placed upright on the end, so that any water which fell upon the pile was immediately drained off. After being sawed they were neatly put up under cover.

I have already referred to their magnificent barn, built of stone of a circular form, three stories in height, ninety-six feet in diameter, and capable, as well as may be calculated, of containing from three to four hundred tons of hay. The carts enter in the second story ; the floor or drive-way is continued round by the wall for the whole of the circle, so that the cart passes round the entire distance, and when the hay is discharged, goes out at the same door at which it entered. All the hay is deposited in the centre. Several loaded wagons may stand in the floor, and be sheltered and unloaded at the same time.

The roof is a beautiful and curious specimen of carpentry ; and appears to be most securely supported. In the centre of the floor, there rises to the apex of the roof a single column as large as an admiral's mast, around which a hollow frame of slats is fixed, and which serves as a ventilator or chimney to discharge the steam of the hay. It is open at the top, and protected by a small cupola against the rain. At the same time the hay is raised from the ground, about a foot by an open floor of slats, so that there is, while the hay is new, a constant circulation of air up this chimney ; and one of the friends informed me, that the steam passing from the hay in this mode was oftentimes so dense, that, to use his own expression, "you could wash your hands in it." The arrangements for the cattle are in the lower story, where every animal has its place and number, and where every cow is designated by a label on the post as in milk or otherwise. In this circular form, there is of course a considerable loss of room ; yet the method of feeding is easy ; the place is kept clean ; the whole arrangements are convenient ; and the kindly treated animals standing around this huge mass of hay, have at least the pleasure of seeing the good things in store for them. These friends have singular advantages, in the amount of labor which they are able at any time to command and apply to any object which they have in view ;

and their establishment presents a beautiful illustration of the advantages of well directed industry, neatness, and order. The great rule of domestic economy "a place for every thing, and every thing in its place," is nowhere more strikingly exemplified ; and though they make no pretensions to the fine arts, and have little of what is called taste, yet all their arrangements, and the products of their labor, exhibit the proofs of thoroughness, permanency, utility, and substantial comfort.

Their dairy is exquisitely neat in every part of it. Their piggery is the exclusive concern of a single individual ; and illustrates the utility in a large concern of a division of labor and of individual responsibility. They have attempted an improvement of their neat stock, by the introduction of some of the improved breeds, and the young stock which they were raising from this cross, promised extremely well, though no opportunity had been had to test its qualities for milk. Their land is considered in a great measure unfavorable to the production of grain : and a large portion of their bread stuff therefore is purchased. They have likewise occasionally hired extensive tracts of meadow on the Mohawk river in the state of New York, which they have cultivated by colonies, in order to obtain brush for the manufacture of brooms, a branch of business which heretofore they have carried on to a considerable extent. They keep a large flock of sheep ; and all their woollen fabrics are manufactured among themselves. They likewise are very extensively engaged in the raising of garden seeds, which are put up in a very neat manner, as is well known, and distributed over the country.

A three story brick building or college, erected for one of their families, is most remarkable for its neatness and the excellence of the materials and workmanship. What by the "world's people," is called taste, that is a study of symmetry and beauty in the forms of objects, is studiously abjured by this remarkable community. Yet in the perfection of finish, which they bestow upon every production of their mechanical industry, they show that native perception of fitness, order, and harmony, which constitute the elements of the most cultivated and refined taste. The same amount of expense and labor, of which they are never sparing, already devoted to the construction of their buildings and the arrangement of their grounds, had they indulged themselves even in a slight degree in tasteful ornament,

and embellishment, without impairing at all the convenience, utility, or permanence of their works, might have rendered them extremely beautiful. In so doing they would have found in them a new and prolific source of pleasure, may I not add also of improvement. I know their candor will pardon these suggestions which have no unkind origin ; and which have their foundation in the universal beauty of the natural world, as seen every where and always even in the perishable crystals of the frost, and the fading tints of the sky, in the plumage of the birds, in the unrivalled splendors of the vegetable world ; in a word in every production of the divine power and goodness from an atom floating in the sunbeam to a planet, wheeling its course in the glittering arches of the skies.

XI. EXPERIMENTS AND IMPROVEMENTS.

I have already referred to the experiments made in the application of lime and marl. They are not of a sufficiently extensive or exact character to be deemed conclusive. It is hoped, as suggested in the valuable report of the geological surveyor, that they will be continued. There is no reason to doubt, from the long experience of other countries, that in her lime and marls the county of Berkshire contains inexhaustible sources of productiveness and the means of greatly improving her soils.

The improvement of agriculture, as a science and an art, depends greatly upon facts. Experiments, illustrating what can or what cannot be done, are of great value. Farmers object to agricultural experiments, as involving expenditures beyond their means ; but an experiment on a small scale, within the means of the humblest farmer, may be as instructive and conclusive, in reference to the point sought to be ascertained, as an experiment of an extended and expensive character. The point to be mainly insisted upon, and that, in which farmers commonly fail, is exactness of observation. Without this, no experiment is of any value. In this matter I have been so often disappointed, that my importunity will, I hope, be excused, when I urge upon farmers attempting, or at all disposed to attempt,

experiments, to pay the most pointed attention to the mode of conducting them ; their progress ; the circumstances under which they are begun and carried on ; and their actual results.

I believe it must be admitted, that there is no class of men of business so little attentive to exactness, in all their operations ; and none more ready to draw hasty conclusions, or to deal in what are mere guesses, than farmers.

I certainly design no disrespect to the farmers, when I give an example of a conversation to which I am too often a party. Indeed I should be almost willing to give offence, if I could by any means induce to more precision and carefulness.

Thus : if I ask a farmer, if he has used lime on his land or his crops ? he answers, yes. In what quantity to the acre ? he did not measure the lime or the land. Could he see any difference where he limed, and where he did not lime ? he limed the whole field equally. Did he apply it with or without manure, single or in compost, or did he apply it to a part of the field with or without manure ? he applied it to all parts of the field in the same way. Did he perceive any good effects upon the field thus limed and manured ? yes. How were these effects ascertained ? did he measure the crop ? no, he measured nothing, but he was of *opinion* that the land was benefited by the application ; he *thought* there was a difference in the result from what would have been, had it not been limed. But was this difference attributable to the lime or the manure ? it was all limed and manured alike ; but he *supposed* it was the lime. I might go on, but this will suffice. This is a true account of the manner in which my inquiries are often answered ; and shows how what farmers call experiments are often conducted. But can any thing be plainer, than that by such experiments no certainty is reached. Whether any advantage was obtained from liming alone, or liming with manure cannot be determined, because the field was all served alike, and there were, therefore, no means of comparison. Again ; if the crop is not measured and compared with a crop not thus managed, how can it be determined what has or has not been gained ? Again : if neither part was served with lime alone, and neither with manure alone, and neither part separately from the part with lime and manure in combination, how could any thing be determined in regard to the comparative value or use of lime or manure singly or in conjunction ? Then

again, if any thing has been effected, yet, if nothing has been measured, neither lime, nor manure, nor land, nor crop, how can it be ascertained what has been done, and what efficacy or utility is to be accredited to the lime ?

I state this case, which is not in any respect exaggerated, to illustrate the difficulty of arriving at correct results solely from the neglect of intelligent and exact inquiry and experiment. But I shall be answered, that it would be too much trouble to be as exact and particular as I propose. This is an answer which an inquisitive and intelligent farmer, if he means to respect himself, will be very shy of giving. In most cases, however, it costs scarcely more pains to conduct and observe an experiment with exactness, than to do it in the uncertain way in which it is commonly done. But in the latter case we may be properly said to determine nothing ; in the former we reach the object of our inquiry, which is generally much more than a compensation for any pains-taking it may cost us. But in no matter whatever is knowledge of any substantial value acquired without labor and careful inquiry. We might as well complain that we cannot obtain the harvest without sowing the seed, and tending and cultivating the growth. But the constitution and laws of the divine providence in these cases are inviolable, and not to be turned aside for our convenience or indolence ; and as far as concerns man's moral benefit, the benevolence of this unchangeableness corresponds with its infinite wisdom.

1. POTATOES.—An experiment in planting potatoes was made by T. F. Plunkett, of Pittsfield, with a view to ascertain the proper description and quantity of seed to be used. I subjoin the account of it ; and deeming them interesting in the same connexion, I add the results of some experiments made with the same view, in Dover, N. H., in the year 1813.

Experiment in planting Potatoes, in 1838, by T. F. Plunkett.

1st Row. Seeded with 1 large potato to each hill ; product 5½ bs., and good size.

2d Row. Seeded with 2 small potatoes to each hill ; product, 4½ bs., and small size.

3d Row. Seeded with 1 small potato to each hill ; product, 2¾ bs., and small size.

4th Row. Seeded with 1 seed end to each hill ; product, 3 bs. and small size.

5th Row. Seeded with butt end to each hill ; product, 5 bs., and good size.

6th Row. Seeded with one-half potato to each hill ; product, 4½ bs., and middle size.

7th Row. Seeded with 2 common size potatoes to each hill ; product, 6 bs., and varied sizes.

8th Row. Seeded with 1 pink-eyed potato to each hill ; product, 3 bs., and fine size.

9th Row. Seeded with 1 black kidney-shape, to each hill ; product, 4½ bs., and fine size.

Remarks.—The first seven rows were planted with the Burr or flesh-colored potatoes. The first row produced decidedly the handsomest potatoes for size, and I should say that they were the most profitable. All were manured and cultivated alike.

Result of fifteen Experiments made at Dover, (N. H.) A. D. 1813, of seeding Potatoes, consisting of twenty hills—the rows three feet apart, hills two feet, without any manure, on sandy loam that had been two years planted.

Number of experiments.	Quantity of seed.	Description of the seed as put into the ground.	Weight of seed, in 20 hills.		Total produce.
			lbs.	oz.	
No. 1	12	Two whole potatoes, ...	15		80
2	6	One do.	7	8	48
3	12	Two do. cut in halves, latitudinally,	15		61
4	6	One do. do. do.	7	8	55
5	2	The eyes of two potatoes which weighed 12 oz.	3	4	28
6	1	The eyes of one do. do.	1	10	20
7	6	One potato cut in quarters, longitudinally,	7	8	56
8	3	Half do. do. do.	3	12	35
9	3	Half do. cut in halves, do.	3	12	37
10	1½	One quarter of a potato, ...	1	14	32
11	4	Four potatoes, whole wt. 1 oz. each, produce small size, ...	5		39
12	2	Two do. do. do. rather small,	2	8	35
13	1	One do. do. do. good size,	1	4	31
14	4	The sprout end of two potatoes, ½ of each,	5		42
15	6	One potato, weight 6 oz. eyes cut out, .	7	8	33
			88	0	632
Gain by manuring, ...					143

lbs. 775

The following fifteen experiments are exactly the same as the former, with the addition only of a shovel full of good barn manure to each hill.

Number of experiments.	Quantity of seed. oz.	Description of the seed as put into the ground.	Weight of seed in 20 hills.		Total produce.
			lbs.	oz.	
No. 1	12	Two whole potatoes, ...	15		76
2	6	One do.	7	8	46
3	12	Two do. cut in halves, latitudinally,	15		73
4	6	One do. do. do.	7	8	64
5	2	The eyes of two potatoes which weighed 12 oz.	3	4	44
6	1	The eyes of one do. do.	1	10	46
7	6	One potato cut in quarters, longitudinally,	7	8	65
8	3	Half do. do. do.	3	12	48
9	3	Half do. cut in halves, do.	3	12	54
10	1½	One quarter of a potato, ...	1	14	38
11	4	Four potatoes, wt. 1 oz. each, the produce, small size, ...	5		52
12	2	Two do. do. rather small,	2	8	44
13	1	One do. do. good size,	1	4	37
14	4	The sprout end of two potatoes, ½ of each,	5		46
15	6	One potato, the eyes cut out, ...	7	8	42
			88	0	775

*Result of ten experiments of seeding Potatoes, twenty hills each, manured with a small handful of *Rock-weed.*

Number of experiments.	Quantity of seed. oz.	Description of the seed as put into the ground.	Weight of seed in 20 hills.		Total produce.
			lbs.	oz.	
No. 1	12	Two whole potatoes, ...	15		73
2	6	One do.	7	8	61
3	6	One do. quartered longitudinally,	7	8	67
4	3	One half potato, divided do.	3	12	52
5	1½	One quarter of the potato, ...	1	14	26
6	8	Four whole potatoes, 2 oz. each, ...	10		69
7	6	Three do. do.	7	8	44
8	4	Two do. do.	5		53
9	2	One do. do.	2	8	42
10	2	One do cut in halves, ...	2	8	47
			63	2	534

* *Fucus* of Lin. much used as a manure for raising corn on sandy plains in this vicinity.

The foregoing experiments prove, what all experienced farmers were convinced of, that poor land requires more seed in all kinds of crops, than that under a high state of cultivation.

N. B. A bushel of potatoes weighs 56 to 58 lbs.

The potato used for seed in the above described experiments was the large blue."

Robert Campbell of Pittsfield, states that potatoes, which are cut early, come up sooner ; and remain through the season in advance of those which are not thus cut. This, he says, is confirmed by the experience of other farmers, who recommend therefore that potatoes should be cut and dried sometime before planting.

Jonathan Allen of Pittsfield has tried planting 45 bushels of seed to an acre, and in another case 13 bushels ; the result in the latter case was better than in the former. This is at variance with the experience of many farmers. He is desirous of having four sprouts in a hill. The quantity of seed to an acre should depend somewhat on the manner of planting and condition of the land. Drill planting requires more seed than planting in hills ; but the crop may be expected to be larger. In drills three feet apart and with good sized sets or cuttings one foot apart in the rows about twenty-five bushels for seed will be required.

Wm. Boardman of Sheffield, who is successful in raising very fine potatoes and of a large size, always plants those which are large ; and says they should not be planted deeply ; nor covered much ; nor often ploughed. His potatoes, which I saw, were remarkable for the absence of small potatoes.

They have a black potato in Pittsfield, of a kidney shape, which is of great excellence, but does not yield abundantly. I do not know its origin. In the starch manufactory at Williamstown, they have found the long red or La Plata potato unfit for their purposes until the spring, and then not deemed equal to many other kinds. This would seem to indicate the proper time for eating it ; and for giving it to stock.

Mr. Plunkett of South Adams, gives the opinion of an Irish gentleman, strongly against giving potatoes freely to milch cows. It is condemned in his country, as serving to enlarge to too great a degree the milk vessels of the animal and thus produce disease. The ani-

mal so fed falls away the second season. Mr. P. is opposed to their use for ewes for the same reason.

For fattening wethers I know well their value. Gayton Williams of Heath, Franklin Co. is accustomed to boil them and give them freely to his wethers, and ewes which are coming forward with early lambs. May not the cooking of them correct the injurious qualities attributed to them by Mr. Plunkett, when given raw? For fattening oxen in Deerfield, Franklin Co., five bushels of raw potatoes are deemed equal to one bushel of corn. In my own experience the advantages from the boiling of potatoes for fattening cattle are not an equivalent for the expense and trouble. In a very exact trial made in this matter in France, the advantages in fattening sheep of cooked over uncooked potatoes were only as 13 to 12. This difference will scarcely pay the expense. Potatoes are a crop so well known among us, that little need be said as to the mode of cultivation. If a large crop is desired, my opinion is that they should be planted in drills; the rows being about two and a half feet or three apart, and the sets placed not less than a foot apart in the rows. They may then be mainly cultivated with the plough. They should not be planted deeply; and they should be kept clean. In general few plants are cultivated in a more slovenly manner. Under good cultivation, few crops afford more valuable feed to an acre. They are, I believe, however an exhausting and not an ameliorating crop. They return little to the soil; and the almost universal experience is that wheat does by no means so well after potatoes as after Indian corn. They are in general so much neglected in the cultivation that the ground becomes surcharged with weeds.

2. CARROTS. Jeremiah Valet, late of Stockbridge, but now an emigrant to the fertile west, a true philosopher in a homely garb, a pure diamond though never in the hands of the lapidary, (I would not say this if he were not out of the reach of my voice,) was much in the habit of raising carrots; and gave a preference to them over every other vegetable for fattening swine and cattle. This was the result of repeated trials and long experience. To fatten swine he gives them boiled; to store hogs, raw. His crops average 800 bushels to the acre.

Jno. Merrill of South Lee, has been a very successful cultivator

of carrots. He states the yield on two acres at 600 bushels to the acre; and the cost of cultivation, exclusive of manure and rent of land, at 25 dollars per acre; or a little more than four cents per bushel. For feeding horses, he says, he should prefer one hundred bushels of carrots and one hundred bushels of oats to two hundred bushels of oats. He applied them in a raw state to the feeding of his team horses, and horses in preparation for market; and they were kept by them in high health and spirits. Oats followed his carrot crop on the same ground with great success. The experience of J. C. Curwen, Eng. in the use of carrots for horses, corresponds with that of Mr. Merrill. The authority of Curwen is unquestionable; and he was in the habit of employing constantly as many as eighty horses on his farm and in his extensive coal mines.

"I cannot omit" he says, "stating the great profit of carrots. I have found by the experience of the last two years, that where eight pounds of oat-feeding was allowed to draft horses, four pounds might be taken away and supplied by an equal weight of carrots; and the health, spirit, and ability of the horses to do their work be perfectly as good as with the whole quantity of oats. With the drill husbandry and proper attention, very good crops of carrots may be obtained upon soils, not generally supposed suitable to their growth."

He adds in another place. "The profits and advantages of carrots are in my opinion greater than any other crop. This admirable root has, upon repeated and very extensive trials for the last three years, been found to answer most perfectly as a part substitute for oats. Where ten pounds of oats are given per day, four pounds may be taken away; and their place supplied by five pounds of carrots. This has been practised in the feeding of eighty horses for the last three years, with the most complete success, and the health and condition of the horses allowed to be improved by the exchange. An acre of carrots supplies an equal quantity of food for working horses, as sixteen to twenty acres of oats."*

My own experience of the value of carrots, which has not been small, fully confirms these statements. I have obtained at the rate of more than a thousand bushels to the acre on three quarters of an

* Curwen's Hints on Agricultural Subjects.

acre ; but on several acres my crop has usually averaged 600 bushels to the acre.

— Smith of Middlefield, Hampshire county, from three-fourths of an acre obtained 900 bushels.

Charles Knowlton of Ashfield, Franklin county, this year obtained 90 bushels on twelve rods of ground. This was at the rate of 1200 bushels to the acre.

D. Moore of Concord, Middlesex county, from six rods of land, obtained this year 56 bushels, or at the rate of 1493 bushels to the acre.

According to Josiah Quincy's experience in Quincy, Plymouth co. charging labor at one dollar per day his carrots cost him eleven cents per bushel. David and Stephen Little, in Newbury, Essex county, in 1813, obtained 961 bushels to the acre, at an expense of \$79, 50 every expense included, excepting rent of land. This was at a rate less than nine cents to a bushel.

I shall subjoin in the Appendix an account of an experiment made in feeding swine, illustrating the value of this vegetable, from Arthur Young.*

The great objection to the cultivation of carrots lies in the difficulty of keeping them while growing free from weeds. If sowed without any preparation, the seed is a long time in germinating ; and a plentiful crop of weeds is liable to get possession of the land before the carrots make their appearance. There is another difficulty. The carrot seed from its minuteness is liable to be sowed too thickly. To obviate in a degree these objections, let the ground be ploughed deeply, well manured, and put in fine tilth ; and let the first and perhaps the second crop of weeds be ploughed in. After this let the land be thrown into ridges two feet apart, and the seed sown on top of the ridges either in a single line, or the ridges be made so wide as to receive two rows of carrots, eight inches or one foot apart. In the mean time the seed should be freely mixed with fine sand ; and this sand kept so moist that the seed shall germinate. As soon as it is sprouted it should be sown. This may be so arranged that the sowing shall take place about the first of June. They will then have the start of the weeds. The mixture with sand will prevent their

*Appendix E.

being sown too thickly. After the first thinning and weeding is over, if done with care, the battle may be considered as won. Afterwards let them be cultivated with a plough or cultivator and kept clean. When the time of digging arrives, the work will be greatly facilitated by passing a plough directly along the side of the carrots ; and they are easily thrown out by the hand.

3. **RUTA BAGA.**—Ruta Baga are differently estimated by different individuals. Mr. Merrill of Lee, Valet of Stockbridge, Lawton of Sheffield, Bacon and Chapin of Richmond, Colt, Goodrich and Plunkett of Pittsfield, highly approve of ruta бага ; and some of them consider them of equal value with potatoes for swine or cattle. Mr. Werden of Richmond, dislikes them, and says the general experience of farmers there, is against them. It is difficult to reconcile these contradictory statements. They are by no means so nutritious as potatoes, especially those kinds of potatoes which are most farinaceous ; and they are not comparable to carrots or parsnips or the sugar-beet for feeding stock. But they are a valuable, though an exhausting crop ; and are raised at comparatively little expense. The golden yellow turnips with purple tops are the preferable kind. The white kinds, and what are called the French turnips, are an inferior plant.

Mr. Merrill of Lee, applied them to the fatting of cattle with much success. He purchased a yoke of cattle in the fall, in low flesh, at \$50, and having fed them through the winter on 2 bushels of ruta бага each per day, with good hay but with no other provender, he sold them in the spring for \$170, at \$8 per 100 lbs.

Mr. Ashburner of Stockbridge, whose cultivation of vegetables is nowhere excelled in neatness and productiveness, is in the habit of transplanting his sugar-beet by merely making a hole with a hoe, and laying them in horizontally keeping the tops free. He has found planting with a dibble too slow a process ; and the plant is not so likely to live, as the fine dirt is not so easily brought up to the small roots of the plant. He has tried the transplanting of wheat by way of experiment, but it was not successful.

I have transplanted ruta бага with great despatch and entire success, simply by ploughing a furrow ; then taking the plants from a seed-bed, dipping them in water, separating them and laying them

along in the furrow, with the top on the furrow-slice, at a distance of a foot apart, as fast as a man could walk ; and soon following with a plough and covering them. It is well to go over the ground with a hoe to relieve plants that may be too deeply buried, and to cover those which may by accident have been left exposed. They are almost certain to live ; and I have thought the work not more than to thin them out when they are sowed thickly, where they are to stand. There is an additional advantage in this method, that the plants may be forwarded in the nursery, when it is not in your power to prepare the land in season for sowing the crop where they are intended to stand. I am not able to say whether the sugar-beet is as tenacious of life ; but the experiments of Mr. Ashburner lead to such a presumption.

4. OATS.—John M. Hurlbut in Great Barrington, whose establishment within and without doors is a beautiful pattern of exact, neat, and profitable husbandry rarely equalled, is of opinion that oats should be sown just at the time when the grass starts vigorously. The crop is injuriously affected from too early or too late planting.

5. WHEAT.—The Messrs. Spurrs and Messrs. Curtis of Sheffield, Messrs. Bacon of Richmond, John L. Cooper and Philo Parks of Sheffield, John M. Hurlbut and Ralph Taylor of Great Barrington, Eldad Post of Lenox, and others, have used lime for wheat without any perceptible advantage. Ralph Taylor has applied lime to his land at the rate of 200 bushels to the acre, and harrowed it in, but now after three or four years, perceives no benefit. These gentlemen, Claudius Wheeler of Great Barrington, and a host of others all hold the opinion that the blasting of wheat depends upon atmospheric influences ; the condition of the weather in certain stages of the growth of the wheat, rather than upon any condition of the soil. The great consideration to which the opinions of these gentlemen are entitled, will be acknowledged by those who know them. I do not mention their experience as at all decisive of the inutility of lime ; but as showing in how great obscurity the subject is involved, and how much need there is of farther inquiries and experiments of an exact character.

Adonijah Jones of Otis says, that when he was accustomed to plough in the seed of his winter wheat instead of harrowing, he seldom had any killed by frost. The experience of a competent farmer in Northampton, leads to a similar conclusion. From an experiment on spring wheat made by Derrick I. Spurr in Sheffield, it would seem that harrowing or dragging it was preferable. He was advised, in sowing his seed last spring, not to plough in his seed. But he ploughed in a small strip in the centre of his field; the wheat on this part exhibited a taller and stouter growth, but it did not come up so well; much seed appeared to fail, and had he ploughed in the whole, he thinks he should not have had a third of the crop which he obtained by simply dragging in or harrowing in the seed.

Eldad Post, of Lenox, is in the practice of harrowing his field of wheat daily after it has been sown, for ten days; and considers the practice of great utility. It quickens vegetation, by bringing the earth to the sun and air. It is a custom in France, to harrow wheat with a light harrow after it has attained a growth of four or five inches. I have several times tried this method with great benefit. The vegetation is greatly assisted by bringing fresh earth often to the plants, and keeping the ground loose and fine; or as farmers sometimes term it, alive, provided it can be done without inflicting too great an injury on the small fibres and rootlets of the plants.

E. Post lost his first sowing of Italian wheat, which he attributes to the exclusion of the wheat from the external air in tight casks, by which he thinks its germinating power was destroyed; and says he knows facts, which go to confirm this opinion. O. Curtis, of Sheffield, says much of his seed wheat was destroyed by being soaked too long in the brine.* Mr. Hathaway, of Rome, N. Y., by whom the Italian wheat was first cultivated in this county, says this kind is more liable to injury from this practice, than other wheat. I mention these opinions, not as endorsing them; but as the observations of intelligent and observing men, and therefore deserving of consideration and inquiry. Is it not possible, that Mr. Post's wheat may have been put up in a damp state, and injured by being heated in the cask? Mr. Curtis's opinion is not according to the judgment of many farmers who do not object to the wheat's remaining long in the brine, provided it is not exposed before sowing to the alternatives of drying and wetting.

*Appendix F.

Levi Goodrich, of Pittsfield, showed me a field of considerable extent, where in one part clover and grass followed corn ; in the other part of the same field, and all other circumstances similar, clover and grass followed potatoes. The grass after corn was excellent ; after potatoes, not one-sixth as large. A result somewhat similar has followed in respect to wheat taken after corn or after potatoes. The testimony of the farmers, as given to the committee of the Agricultural Society for viewing crops, and to myself likewise, is equally decisive in this matter. The inference seems plain, that potatoes are a much more exhausting crop than corn.

The subject of the wheat-culture has, within two or three years, attracted great and not undeserved attention through the state. The causes of its failure have been matter of much inquiry and discussion. The deficiency of calcareous matter, or the carbonate of lime, has been confidently pronounced the great and sole cause. That some portion of lime in the soil in some form is essential seems generally conceded ; but that a certain amount of the carbonate of lime is indispensable, is not so fully borne out by facts, as to be pronounced unquestionable. On a soil in Chelmsford, wheat has been raised for twenty years at the rate of from twenty to thirty bushels to the acre ; and with but a single instance of failure during that time. From Dr. Dana, who, with the most public-spirited views, is disposed to render any aid in his power to the cause of an improved agriculture,—and few individuals in the country are capable of rendering so important chemical services,—I have obtained an analysis of the soil of this farm, which I shall subjoin in the Appendix.* It will be seen, from that analysis, that “it contains no trace of the carbonate of lime.” This remarkable result shows the necessity of extreme caution in adopting with confidence any theory on subjects so recondite and mysterious as every thing in nature connected with animal and vegetable life, until at least we are able to say what, in either case, life itself is. This is a matter in which the superficial may see no difficulty of explanation ; but, in truth, it is a secret and mystery, the solution of which the truly philosophic mind will perceive is not yet even approached. That the application of lime to land has been often attended with the most beneficial effects, facts demonstrating such re-

* Appendix D. Letter II.

suits, do not leave us room to doubt. In this place, however, it is not convenient to me to go farther into a subject, which, in the progress of the survey, will receive its due share of attention.

My own belief is, that there is as much lime now in our soils as was ever to be found there. Formerly, there was no difficulty in raising wheat here of the best quality. Now it is often raised successfully, and always on newly cleared land, excepting only accidents, which have no connexion with the soil, accidents from insects and changes or conditions of the weather. I believe therefore there is, in fact, no difficulty, under proper management, in its cultivation; and a crop of wheat may be considered ordinarily as certain as other crops. This the experience of many farmers confirms.

The great point to be aimed at is to bring a new soil to the surface, on which to plant your wheat. Plough therefore deep; completely invert the sod, and keep it undisturbed. Bring a portion of the subsoil to the surface, to be operated upon by the influences of sun, rain, air, and compost manure. Then make corn your first crop; and wheat your second; or make wheat your first crop; and with proper seeding and tith, there is reason to believe that your crop will be as sure as human skill can make it. So many facts, confirming the success of this process, have come under my knowledge, that I feel if not an absolute yet a very strong confidence in it; and urge it upon the farmers to make a fair experiment.

Our cultivation is in many cases too superficial. In the First Report of the Agriculture of Massachusetts I took much pains to recommend the introduction of a subsoil plough, of which I then gave drawings and a full account. From farther inquiries and some experiments, which have come within my observation, my convictions of the great utility and importance of such an implement are strengthened; and I earnestly request the attention of the farmers to the subject as therein treated, and to experiments with it, by which, under proper management, I verily believe the productiveness of their soil may be increased five and twenty or fifty per cent.; and many parts of Massachusetts be rendered as productive in the bread-grains, as those other parts of our country, which have been deemed singularly, and in this respect almost exclusively, favored.

6. WIRE-WORM.—Manning Brown, of Williamstown, says,

that in planting Indian corn upon green-sward, he has always suffered much from the wire-worm ; but when he makes his first crop oats, and his second corn, he has entirely escaped the injury from this source. He has found, likewise, opening the corn-hills, and pouring a spoonful of brine at the roots a remedy against their ravages. This would be a tedious process.

Some of the best farmers in Massachusetts recommend, from their own experience, late spring ploughing, as the great preventive of the depredations of the cut-worm among corn. In the vegetation, which is then turned under, the worms find sufficient feed to divert them from the corn. Other farmers in this matter have recommended ploughing early in the autumn, say in August ; and the grass which has then time to start up among the furrows, supplies the worm, and prevents his attacks upon the corn. But on various accounts, the spring ploughing for this purpose is to be preferred. It seems to be established, that a freshly turned soil is more favorable to vegetation than one that has been longer ploughed ; and the seed should be deposited as soon as may be after the land is ploughed and prepared. Mr. Keely's experiments in sowing rye, fully detailed in the report of Essex county, strongly urge this point.

7. GRAIN-INSECT—(*Cecidomyia Tritici*.)—Mr. Brown has proved to his own conviction, the value of the application of newly slacked lime upon his wheat, at the time of flowering against the ravages of the grain-insect. “ The field had just been visited by the fly, when he gave his wheat a thorough coating of newly and finely slacked lime while the dew was upon it. On a part of the field no lime was put. On the parts limed, their ravages seemed to have been stopped at once ; on the part not limed, the crop was entirely destroyed.” Mr. Brown's excellent husbandry gives a value to his authority.

8. GRAIN-WORM—(*Vibrio Tritici*.)—I found in Egremont a worm abounding in the grain in two cases, which none of the farmers had been before acquainted with. It was of a brown color, and about a third of an inch in length ; and when the wheat was threshed, it was found in great quantities among the chaff. The threshing and winnowing the wheat appeared to have thoroughly cleared it of them.

There was evidence that they had destroyed a great many heads ; and had not the wheat been threshed and cleaned, their injuries would have been much more extensive. These two cases are the only ones in which I had ever seen or heard of this worm.

It is, however, not unknown abroad. From plates and accounts given in the Penny Magazine for 1833, Nos. 86 and 90, as well as I can judge, the same insect is described as the *Vibrio Tritici*, and the different stages of his progress are fully illustrated by plates ; I shall make some extracts from it in the Appendix.* The account is too long to be presented here. The paper says, “ the existence of this most extraordinary disease in wheat has been, comparatively speaking, but a very short time known ; and it is only of a very recent date that it has attracted the notice of the practical agriculturist in this country.” In the county of Kent, Eng., it seems, however, to have been known for some years.

9. LOCUST-BORER.—Allen C. Metcalf of Lenox, washed his locust trees with spirits of turpentine, and in that way, as he believes, compelled the borer to leave them, after they had made severe ravages. The trees, as I saw them, were much perforated, but there were no where any signs of the presence of the worm.

XII. REPORTS OF FARMS.

I shall now give a few reports of farms in the country as illustrative of the general condition of its husbandry. The numbers are a mere index to the arrangement ; and express no preference of character or condition.

FARM I.—Wood 60 acres, tillage 30 acres, mowing 80 acres, pasturage 180 acres. At a distance from home 200 acres in pasturage. Stock—sheep 1000, oxen 8, milch cows 6, horses 3. In 1837-8, there were raised on this farm mainly for the consumption

* Appendix G

of the stock :—ruta бага 1 acre and 2 rods, 1080 bs., English turnips 5 acres, 4300 bs., potatoes 3 acres, 1244 bs. Total 6624 bushels.

I quote from the report of the above farmer as follows : “ As to the value of the respective vegetables for food, the following statement will perhaps best exhibit it. I have commenced feeding, and shall continue to feed

14 head of horned cattle each per day, with 20 lbs. cut straw at 4 cts. for each 20 lbs., ...	56
Also to each 113 lbs. roots grated mixed with straw, 3 cts. each, ...	42
Allow 150 days for the season of feeding at 98 cts. is	\$147 00
The same stock would require 20 lbs. of hay each per day ; for 150 days they would consume 42,000 lbs., equal to 21 tons, at the moderate price of \$10 per ton, ...	210 00
	\$357 98
Balance in favor of the root feed on 14 head is	\$63 00

You will perceive that the value of vegetables for food is 6 cts. per bushel, while hay is at \$10 and straw at \$4 per ton. The extra cost in preparing the food is more than balanced, if proper care be taken, by the extra quantity of manure made.” The current year 1838-9, there are on this farm more than fifty acres under the plough. In wheat 10 acres, in oats 20 acres, in ruta бага 2 or more—in carrots, potatoes, &c. &c.

FARM II.—200 acres exclusive of wood, horses 4, oxen 6, cows 8, sheep 700, swine 5, young neat cattle 12.

Mowing 40 acres upland, 2 tons to an acre, intervale alluvion 50 acres, two tons to the acre ; wheat 10 acres, 2 give 10 bs. to the acre, 4 acres give 20 bs. to the acre ; Indian corn 3 acres, 2 give 58 bs. to the acre, 1 gave 93 bs. ; rye 14 acres, 16 bs. to the acre ; potatoes 8 acres, 6 acres give 200 bs. to the acre, 2 acres give 450 each ; ruta бага 5 acres, 700 bs. to the acre ; pork 2000 lbs. ; average yield of wool 3 lbs. to a sheep.

FARM III.—Acres 102, tillage 23, mowing 14. Crops—hay 57 tons, $1\frac{1}{2}$ ton to the acre ; wheat one acre, $28\frac{1}{2}$ bs. ; Indian corn $6\frac{1}{2}$ acres, 390 bs., 60 bs. to the acre ; rye 3 acres, 56 bs. ; oats 245 bs. ; buckwheat $28\frac{1}{2}$; potatoes $1\frac{1}{4}$ acre, 345 bs. ; turnips 100 bs. ; ruta бага 60 bs. ; pork 3300 lbs. ; butter 481 lbs. ; new milk cheese 100 lbs. ; wool 600 lbs. ; cider 57 bbls. ; winter apples 40 bs. ; lambs raised 76, valued at \$1 75 cts. each ; calves raised 4, valued at \$6 each ; sheep sold 34 ; amount \$65 50.

Stock on the above farm—horses 3, oxen 2, sheep 185, cows 4, swine 15, young stock 4.

FARM IV.—Acres 153 exclusive of wood ; mowing 30, pasture 71. Stock—horses 3, oxen 6, cows 5, sheep 50, swine 19, young cattle 10.

Products—hay $52\frac{1}{2}$ tons, $1\frac{3}{4}$ tons to the acre ; wheat $1\frac{3}{4}$ acres, $35\frac{1}{2}$ bs. ; Indian corn $343\frac{1}{2}$ bs., 49 to an acre ; rye $2\frac{1}{4}$ acres, 60 bs. ; oats 15 acres 500 bs., $33\frac{1}{3}$ bs. to an acre ; potatoes 1 acre, 320 bs. ; turnips $\frac{1}{3}$ acre, 45 bs. ; beef 8100 lbs. ; pork 2147 lbs. ; butter 650 lbs. ; new milk cheese 558 lbs. ; wool $133\frac{1}{2}$ lbs. ; cider 18 bbls. ; winter apples 20 bbls. ; straw $12\frac{1}{2}$ tons ; corn-fodder $3\frac{1}{2}$ tons. The amount of sales from this farm up to 9th of Jan., was \$712 75. The live stock raised on it was of the finest description.

FARM V.—Acres 209, of which 36 in wood. Stock—horses 4, oxen 4, cows 6, sheep 350, swine 48, colt 1, young neat stock 8.

Products 1838—hay 88 tons ; wheat 240 bs. ; Indian corn $710\frac{1}{2}$ bs. ; rye 125 bs. ; oats 150 bs. ; pease and oats 90 bs. ; potatoes 700 bs. ; turnips among corn 75 bs. ; ruta бага 1500 bs. ; beef 3950 lbs. ; pork 7880 lbs. ; new milk cheese 1783 lbs. ; butter 540 lbs. ; wool 962 lbs. ; cider 5 bbls. ; winter apples 40 bs. ; straw 15 tons ; corn fodder 12 tons ; manure made, 360 loads.

The amount of sales on this farm in 1838, were \$1289 79. The value of produce used or on hand was \$2309 59.

FARM VI.—Acres 200. Stock—horses 3, oxen 4, cows 18, sheep 50, swine 25, young neat stock 20.

The return of produce given from this excellent farm is very imperfect. $23\frac{1}{2}$ acres were in winter grain, 14 acres in spring grain,

1½ acres of potatoes, ½ acre of turnips, Indian corn 20 acres at 75 bs. to the acre ; pork fatted 4500 lbs. ; butter 1500 lbs. ; new milk cheese 4000 lbs.

FARM VII.—Acres 525 ; of this, however, 270 acres are in distant pasturing, and 100 in wood, leaving 155 in tillage, mowing, orcharding, wet meadow, &c. &c. Stock—horses 4, oxen 4, cows 4, sheep 500, swine 15, young neat stock 28.

Products—hay 130 tons of best quality ; 30 tons of inferior ; wheat 167 bs. ; rye 280 bs. ; oats 600 bs. ; potatoes 1300 bs. ; turnips 250 bs. ; Swedish turnips 1440 bs. ; beef fatted 6000 lbs. ; pork 1480 lbs. ; butter 360 lbs. ; wool 1280 lbs. ; maple-sugar 150 lbs. ; winter apples 60 bs. ; apples for swine 200 bs. ; straw 20 tons ; wood sold 100 cords ; manure made 260 loads ; manure bought 25 loads ; calves sold 6, \$5 each ; 80 lambs raised this year from 80 ewes.

FARM VIII.—Land which can be tilled 200 acres ; mowing 35 acres ; orcharding 3 acres ; wood 150 acres ; waste 75 acres.

Live stock—horses 4, cows 20, sheep 54, swine 16, young neat stock 10.

Amount of sales in 1838, \$2250. Expenses—labor, board and team, \$1125.

Crops—hay 55 tons ; wheat 39 bs. ; Indian corn 300 bs. ; rye 300 bs. ; oats 1000 bs. ; potatoes 500 bs. ; ruta бага 100 bs., other vegetables 30 bs. ; butter 300 lbs. ; beef 1500 lbs. ; pork 5200 lbs. ; new milk cheese 3000 lbs. ; wool 180 lbs. ; cider 40 bbls. ; winter apples 100 bs.

XIII. AGRICULTURAL STATISTICS.

I might extend these reports, having through the kindness of many friends in the county received a considerable number of returns. These however, will be sufficient as specimens of the general husbandry of the county. To these I subjoin a document which I am persuaded will possess much interest. That is a complete return,

made with as much exactness as the nature of the case admitted, of the agricultural produce of the town of Pittsfield. I was anxious, in order to give a just and impartial view of the husbandry of the state, to obtain, from some prominent town in each county, such returns as are here presented. I have, to a degree, succeeded, in respect to Berkshire, Franklin, Middlesex and Worcester ; and I cannot but express the hope that they will induce the Legislature to procure such returns occasionally, say once in five years, from every town in the Commonwealth. The value of such statistics to the public would be very great ; and their influence upon the habits of our farmers, in leading to exactness of measurement and calculation, inquiry and observation would confer an immense benefit.

Inaccuracies may have crept into the estimates. This could not be avoided ; and in a first attempt there are always difficulties to be encountered, which disappear on a second trial ; but every effort has been exerted to make it as true as under the circumstances it could be. On the original document the name of every farmer is given ; but as it might lead to invidious comparisons or remarks, or wound the diffidence of some, if I should give the names to the public, I avoid it. I am exceedingly desirous during the progress of the survey, that my intercourse with the farmers should be as free as possible ; I am desirous, likewise, that any statement which I give to the public should rest upon responsible authority. But I shall never give a name to the public without express permission, or in a case where, I think, consent, if asked, would be withheld.

R E T U R N S

OF

A G R I C U L T U R A L P R O D U C T S

OF

PITTSFIELD, BERKSHIRE CO. MASS.,

FOR

T H E Y E A R 1 8 3 8 ,

Procured at the request of the Commissioner of Agricultural Survey

Returns of Agricultural Products of

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Buck Wh't.	Peas.	Pota- toes.	Ruta Baga.
1	374	150	100	140			600			1200	1800
2	10	3									
3	100	15	60	13	60		60		5	100	20
4	100	15	50	4	60		120		4	40	
5	130	15					80			100	
6	30	5	20				10			50	
7	80	18	75				100			100	50
8	100	20	175	12	10	12	650	100	10	400	
9	4	2									
10	75	10	50		4		50			100	
11	8	3	5				25			25	
12	35	12	20				35			40	
13	56	6					45			70	
14	5	2			6					20	
15	100	25	20				80			100	
16	42	10	10			12	100	22	10	450	
17	22	6	35			7		9		200	
18	80	20	65	6				15		250	
19	27	7					25			30	
20	40	10	20				50			150	300
21	215	45	40	25	40		80		20	150	200
22	128	35	35	10			40			150	
23	36	20	50	26			120			300	300
24	19	8	30	6			50			75	20
25	250	40	35	6	20	20	250	8	14	400	300
26	135	30	15	15			75			200	

Pittsfield, Berkshire Co., for the year 1838.

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
400	2800		1400	936	350	6	4	6	3	1000
			250	160			1	1		
	100		800	300			3	3	1	45
10	140		700	275			2	3		70
	240		300	50			1	1		80
			300	200			2	2		
	125		300	150			1	1	2	50
	150		1100	150			4	1		95
			300	150				1		
	75		400	25			2	2	1	10
							1			
			300	300			1	2	4	
			100	150				1		
			150	150			1	1		
	140		400	300			1	2		40
		800	500	300			1	2	2	
			150					1		
	75	700	350	150			2	2	2	33
			300	200			2	2		
10			600	500	225		2	4	1	
	800		800	200			3	1	2	300
		500	800	500	300	4	1	6	5	90
			800	625	150		2	5		
40			400	200			1	2		
	150	1800	450	400			2	3	1	84
	55		450	400	100	2	3	4	6	

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Buck Wh't.	Peas.	Pota- toes.	Ruta Baga.
27	60	18		15			20			400	
28	80	20	30	20			50		25	350	
29	73	20	40	14			200			60	
30	200	40	100	30			50	60		300	
31	18	8									
32	83	40	60	15			20			50	
33	20	24	60							375	
34	325	90	80	80			500		30	700	700
35	100	40	80	15	30		50		20	350	100
36	30	7	60				50			100	
37	100	50					150			350	
38	120	20	35	50			100			150	
39	525	160		16	280		600			1300	1700
40	72	20	20		40		100		2	200	
41	80	15	30	16			200	10		200	
42	60	12	30		40		80			140	
43	40	8									
44	20	6	20				50	20		100	
45	30	15		15						50	25
46	53	20	6				25		20	230	
47	200	40	20					50		500	
48	56	7	6		30		50	10		100	
49	110	45	15	21			130	35	8	300	
50	226	45	25	17	75		60	75		250	500
51	50	10	70	17			50			100	
52	105	20	50	20	75		80	15		80	200
53	285	50	50		100		200	20	18	300	

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
	25		300	200			2	3	1	10
	80	600	800	100	100	2	1	2		30
	30	800	600	150		2	2	4		10
	300	4000	500	400	300	2	3	4	9	80
			500	400				3		
			300	100			1	1		
			750	300	200		1	3		
150	1400	1200	1300	450		2	2	4	2	500
	300		1100	600			2	4	5	125
	30			150			4	1		10
		2400	750	200		4	3	7		
	50	550	665	200	200		3	3	4	23
	1200	6000	1400	300		4	4	3	25	400
	270		679	200	150		2	3		100
			600	150			3	2	2	
	50		700	100		2	1	3		30
	60		400	100			3	2	8	
	56	650	600	200	300	2		3	10	29
	300	600	650	200			2	2		63
30	19		350	375	100		2	2		
		2500	600	700	1000		1	6	19	
	350	2400	800	100		2	2	1		
	50		300	100			3	1	1	15
	100		700	100	300	2	5	4		40
	150	1200	800	700	100	2	3	11	2	

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
10	120	700	250	200	50		3	2		43
	30	500	250	100			1	1	3	13
		550	300	300	300	2	1	3	8	
	50	6000	600	200		2	1	2	4	15
	550	700	600	300	300	6	3	5	8	230
	120	600	750	400	300	2	2	5	4	14
	25	175	260	175			2	1	1	9
	300	550	900	500	700	2	1	5	1	110
	50	300	500	300			2	2		15
	20		600	300	400		1	4		9
	100		900	300	300	2	1	3		43
	500	1200	1900	700	500	2	4	8	9	200
	60	800	1000	200		2	1	3		29
	9		300	200			1	1		9
	200	550	1000	500	300		2	3		103
		200	275					1		
			500	100		2		1		3
			600	200				2		
	235		650	300			1	2		120
			200	100			1	2		
			300	150				1		
			230	100			2	2		
	450	500	600	400		2	2	4	8	150
	150	800	700	400			2	4		40
	60		300	75			1	2	1	22
	40		500	300	200			2	1	13
			250	100				1		

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Buck Wh't.	Peas.	Pota- toes.	Ruta Baga.
81	7	2								75	
82	7	4 $\frac{1}{2}$	30				25			125	100
83	130	25	20				70	12	25	400	
84	75	15	25	16			300	33	30	250	
85	5	2	30				25			50	
86	100	25	60	26			300	15		300	1000
87	160	35	40		40		60			300	
88	212	60	50	45	100	25	100		20	800	600
89	40	10	20	25						150	
90	1									100	
91	4	4	30							125	
92	200	40	150	20	35		100		20	300	
93	72	16	60	20	10		45			200	100
94	2	4					40			30	
95	1									175	
96	1						25			150	40
97	2	2	25				40			100	
98	7	3	50				30			150	
99	1 $\frac{1}{2}$		50							40	
100	250	60	100	100			300			650	800
101	300	100	120	50	100		200		10	600	500
102	150	20	30			15	300	5		350	150
103	80	12	25		40		100			125	
104	42	8	50		8		85	38	4	250	
105	100	30	250	30	80		40		20	700	
106	40	10	10	9	20		50	5		60	
107	87	18					200			125	

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
				125				1		
			400	300	300			2		
	150		800	600	300		2	2		60
	30		420	200			4	2	1	6
			200	100			1	1		
	175	800	1000	750	200		5	5	2	70
	200	900	900	450		2	1	3	3	72
450	400	2500	600	600		2	2	4		125
			330	50			2	1		
			274				1			
			400	150			1	1		
	400	700	900	600			3	4	2	175
	150		500	300	100	2	3	2	1	55
			500				4	1		
			600	250				1		
			600	400				2		
			300	150				1		
	9		500	300				2		3
			700				1	3		
	1200	1400	1000	400			2	2	2	400
	800	5500	1700	500	600	4	5	5	13	300
	20	100	1500				2	3	8	12
	50		550	250	75		3	2	3	39
	40	570	600	200			1	2	2	15
	300			100			2			130
		700	600	400			2	4	2	2
	50	2700	700	400			2	3	6	14

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Buck Wheat.	Pease.	Potatoes.	Ruta Baga.
108	80	20	80	8			60	7		200	
109	135	20	30		100		150			300	50
110	20	6	40				20		10	200	
111	125	30	80	25	75		100		10	280	
112	86	25	30		18		75	12		200	
113	109	23	50	6	50		100			600	
114	18	6					50			100	
115	100	14	60	20	40		110		30	200	
116	43	10	12				60			80	
117										100	
118	8									100	
119	44	30	40				200			150	
120	20	5								65	
121	48	12	80	8			100			125	
122	88	40	175	65			300			700	200
123	4		40							1200	
124	15	5	75		75					75	
125	300	75	300	36	160		200			300	
126	13	4	98	14			40			156	
127	16		50	7			17			35	
128	4									50	30
129	125	25	50				25			500	
130	18	45					50			300	
131	200	50	50	20	50		100	15		300	
132	72	10	60			212			5	275	250
133	100	30	50	20			100			300	
134	50	12	60	20	20		60			200	

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
14	30	400	750	300			2	2	1	10
	40	700	850	200	100		4	4	6	20
	18	700	600	100			2	2	2	11
			600	200			2	1	2	100
	240	600	700	700		2	2	2	4	40
	80	700	800	300		2	2	2	2	40
			300	300			1	2		
	100	600	1000	200	200		2	4	1	60
	20		300	100			1	1		8
			300	150		2		1		
50			400	200				2		
			1500				22	5		
			400				1	1		
			200	100				1		
		1700	1500	700	200	6		9	6	
			900							
			780				3	1		
	120	13,700	1100	500	400	2	2	5	22	60
			680	200			2	2		
	5	150	160	100			3	2	2	
40			250	300				2	1	
100		1300	2400				5	8		
	40	400	1250				1	3	2	
50		450	500	600	100	2	1	3	5	15
		650	500	200			3	1	1	13
	200	600	650	300			2	2	1	55
50			500				2	4	1	14

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Book Whit.	Peas.	Potatoes.	Ruta Baga.
135	7	2								50	
136	110	25	70		5		100			300	
137	60	10	15				50			150	
138	75	40	140	24	20		200		3	200	200
139	75	15	25		18		100		30	250	
140	3	4½	20				55		27	50	
141	95	50	40	10			230		2	300	
142	80	15	35	50	50		100			150	300
143	32	7	20	80	15		40		20	500	
144	100	35	30	90	15		375		10	500	120
145	4		40	5					8	75	
146	150	40		50	50		400			300	
147		5					50			200	
148	80	18	80	50			30			350	
149	400	118	380	70	57		300			750	300
150	400	100	150	20	50		350			800	40
151	500	250	50	150	120		500			1200	300
152	206	59	30	110			200	212		600	
153	80	12	10	14			40	9		100	
154	148	25	65				45			400	300
155	80	20	70	60			275			150	
156	40	10	13	40			100			400	
157	100	25	10	20			40			250	40
158	7	5					40			125	
159	70	10							6	130	
160	150	40	60	40			120		22	350	
161	130	15	50	35			250			400	

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
			650				2	1		
	200	600	500	600		2	2	4		70
			300	300				2		
100	40	800	800	800	300	4	3	4	10	34
	60	900	1090	300			2	2	4	30
		700	560	400			1	2	1	
		700	600	625			1	5	6	
	120	600	750	400	300	6	3	4	5	18
			600	300			2	2		
	100		700	500	600	2	1	5	6	32
	200	1800	600	400	200		2	4	4	100
			400	100	100				1	
	300	800	1200	1300		2	3	13		14
	300	3800	400	700	1000	4	3	48	48	84
	1000	4100	4000	600	800	8	5	15	14	100
	700	4000	7000	1200	2000	6	10	24	35	300
40	175	1300	2300	725	1000	2	1	11	11	64
			300	125			1	1	4	10
			800	400			2	3	2	
			750	200			2	2	2	
			1000	300			2	4	4	
	220		750	200			2	2	2	
			500	100			1	1		
							2	1	1	20
	50	500	800	500	500		4	5	17	30
	300		600	300			3	2		120

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Buck Wh't.	Pease.	Pota- toes.	Ruta Baga.
162	6	2	15				10			150	
163	67	15	35				25		5	100	15
164	140	15	40	26	75		175		20	200	175
165	56	20	75	20	15	15	75		10	200	
166	80	20	30	15			100			175	
167	30	2	75	20			80			100	
168	15	3	20	10			50			180	20
169	2									400	
170	23	20	15				100		33	200	
171	35	25	50		25		135	7	18	150	1100
172	36	8	15	8			50			100	
173	200	100	200	50	100		300		45	2000	300
174	180	50	35	25			200			300	
175	220	150	180	97	200		500		18	1500	1500
176	12	8	20				110			400	
177	200	90	80	60	60		150	30		300	
178	150	50	100	25			100			350	
179	90	30	65	20			250			250	
180	35	10	30				150			250	
181	240	100		40	450		600			600	
182	105	25	60	25	35		100			125	25
183	230	75	100	85	60		230			600	
184	150	60	120	50	25		125			250	
185	400	110		20			800			500	
186	20	6	20				30			80	
187	8	4	40				116			70	70
188	50	20	40	18	5		120	30		100	100

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
			400	100			1	1	1	
	25		400	300	300		3	2	1	8
	150	1400	800	1000		2	2	6	12	40
		700	600	600			2	4	1	60
	20		800	600				3	4	14
			200	100				1		
			350	300			2	2		
	60		250	150		2	2	2	1	20
	25	600	300	200			2	2		10
	30		400	300	200		2	2		10
	40		500	300			1	2		15
	1000	4000	3000	1000	500	6	4	8	10	200
	360	800	500	300	300		3	3		140
150	1800	10,000	1400	800	800	4	4	8	11	700
300			900	350			2	4		
150		2000	1000	600		8	3	5	15	50
420	450	900	1200	700			3	5	6	105
			500	300			2	2	1	90
			700	300			2	2		
	1000	2000	1400	500		2	2	5	8	350
	50		800	200	100	2	3	5	4	16
	450		1500	600		4	2	5		280
	300	750	600	600	500	2	7	4	8	75
	1500	4500	1000	500	300	2	2	4	4	650
			500	300			1	2		
			400	300			3	2	1	
	150		600	300	100		3	3	2	62

Farms.	No. of Acres.	Hay.	Corn.	Wheat.	Rye.	Barley.	Oats.	Buck W. T.	Pease	Pota- toes.	Ruta Baga.
189	118	25	50	30			200	30		300	150
190	70	20	20	8			150	4		75	10
191	150	40	100	10			200	10		300	125
192	20	10								100	
193	300	75	100	17			180			350	
194	127	40	25	12			500		10	500	100
195	150	40	80	75			110			600	
196	30	4								200	
197	100	15					150			200	
198	90	15	10	30			175			200	
199	230	90	100	12	150		150			250	
200	200	40	50	20	20		100	25	15	400	
201	160	30	70	10	110		100		25	300	
202	80	40	100	25	50		150	10	5	400	
203	200	90	100	30	15		200			400	
204	87	20	100		20		150	10	10	100	
205	24	5	15				16	5		70	
206	10						300				
207	6	2								120	
208	350	80	175	25	25		450			550	175
209	300	80	100	60	25		180			800	100
210	70	12	15				40			200	
211	35	12	60	30			70			200	
212	10	5								100	
213	50	10	40	40			30			300	
214	150	18	30		100		300		20	400	
215	25	5	20				50			100	

Carrots.	Wool	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young Cattle.	Sheep.
	150		600	300	170		3	3	2	70
	65		500	100			2	2	1	26
	450		800	200	100		4	3		147
			500	200			2	2		
30	900		1000	450	428		2	4	3	350
	300	1600	900	400	400		3	4	2	110
	200		700	700	300	2	2	4	2	25
			500	400		2	2	2	1	
	207			200		2	2	2	1	90
	207		600	150			3	2		90
	250	4700	900	300	700	2	3	6	20	140
	275		800	400	200	3		3	7	100
	45		500	300	150	4	1	3	4	14
	450		500	200	100		4	3	3	150
	275		550	400			2	4	3	100
	140		550	100			2	1	3	200
		600	700	300			2	2	3	
							8			
			450	250			2	2		
	1080		750	300			3	2		600
100	600	1000	1000	1500	200	2	2	10	2	280
	30		600	100			1	1		10
	40		300	100			1	1		15
			500				1	2		
	300		300	200			2	2		100
	100		800	500	500		2	4	1	40
			500	100			1	1	1	

Farms.	No. of Acres.	Hay.	C rn.	Wheat.	Rye.	Barley.	Oats.	Buck Wheat.	Pease.	Potatoes.	Ruta Baga.
216	45	15	40	10			100			250	
217	100	40	60	30	70		170			200	
218	300	80	50	41			130			450	100
219	180	50	80	24			50		10	400	500
220	180	50	150	80	50		50		30	300	600
221							300				

Kept by others than farmers, 20 Horses—100 Cows.

AGGREGATE

Of the above Returns from Pittsfield, Mass. Procured by S. L. Russell, December, 1838.

No. of Acres, - - -	20,260	Wool—pounds, - - -	36,740
Hay—tons, - - -	5,058	Beef, “ - - -	136,245
Corn— bushels, - - -	9,963	Pork, “ - - -	133,513
Wheat, “ - - -	3,674	Butter, “ - - -	58,046
Rye, “ - - -	4,676	Cheese, “ - - -	26,048
Barley, “ - - -	318		
Oats, “ - - -	25,191	LIVE STOCK.	
Buck Wheat, “ - - -	1,073	Horses, - - -	475
Pease, “ - - -	820	Oxen, - - -	183
Potatoes, “ - - -	59,311	Cows, - - -	812
Ruta Baga, “ - - -	17,256	Young Cattle, - - -	625
Carrots, “ - - -	2,864	Sheep, - - -	13,687

Carrots.	Wool.	Beef.	Pork.	Butter.	Cheese.	Oxen.	Horses.	Cows.	Young C title.	Sheep.
	200		700	800	800		2	5	3	60
	200	750	600	600	400	2	1	5	7	80
	600		1400	1000	300	2	3	8	4	200
175	500		700	400	1300	2	1	9	4	175
	300		1300	400	300	2	4	5	11	110
			500				12			

NOTE.

It will at once occur upon examination, that the foregoing returns by no means embrace the whole of the agricultural produce of the town. No account is made of fuel and timber of various kinds; none of milk used in families; of poultry consumed and sold; of garden-vegetables; none of fruit, cider, &c. &c.

No returns are made of corn-fodder, which, when well cured, most farmers consider equal to the best of hay, ton for ton; and which, allowing 35 bushels of corn and two tons of fodder to an acre, would amount to 568 tons. No account is made of straw, which, allowing 25 bushels to an acre of wheat, rye, barley and oats, and $1\frac{1}{2}$ ton of straw, would have amounted to 1971 tons.

Some small amount of maple sugar was made in the town—one farmer having made six hundred pounds; others, perhaps, as much. This, as I shall show hereafter, is destined to become a valuable product of the state; several towns, in the spring of 1838, having made twenty, some thirty, and some nearly forty thousand pounds. I have two returns, of over thirty thousand pounds to a town, in Franklin county, ascertained. H. C.

XIII. AGRICULTURAL SOCIETY.

The county of Berkshire has been many years distinguished for its agricultural society, which, in intelligence, enterprise, and public spirit is second to none in the country. It is remarkable likewise in respect to this society that in every part of the county, among the farmers themselves, who, as a class of men are generally distrustful of the advantages of such associations, and seem in such matters oftentimes as well skilled as their oxen in the art of "holding back," its utility is universally acknowledged and a strong interest felt in its success. They are every where disposed in this good matter to pull together; and it would, as it seems to me, be difficult to find, what is technically termed an "off" ox in the team. I regret that I cannot say the same things of all the agricultural societies and all the farmers in the state. If the farmers do not take a strong interest in these institutions, who can be expected to? The state has for a long time extended a liberal patronage towards them; and the money bestowed, if properly applied, would be productive of immense benefits.

All agree that in respect to the county of Berkshire, the best effects have resulted from its agricultural society. It has every where excited and cherished a spirit of generous emulation; and men of the highest distinction in the county for education, character, political standing and wealth give their time and zeal to its excellent objects.

The society called the "Berkshire Agricultural Society for the promotion of Agriculture and Manufactures," was incorporated 25th February, 1811. It has received the annual grant of the government amounting to 600 dollars per year; and has bestowed it in various premiums upon stock, agricultural improvements, and crops. Their first ploughing-match took place on the 7th October, 1819. Since that time the society have held a cattle-show, exhibition of domestic manufactures, and a ploughing-match every autumn. It is holden for two days; and the farmers and the farmers' wives and daughters, lending their encouraging aid and presence to this rural and delightful festival, are congregated from all parts of the county. Applications for premiums on cultivation are made early in the season; and a committee is delegated to visit the premises of every claimant, and examine the growing or standing crops which are

entered for the honorary notice of the society. As I understood the mode of examination adopted by the committees, it was much more matter of judgment than of exact measurement. In all cases of grain-crops or of other crops, which admit of an accurate ascertainment, this should be insisted upon by the society before bestowing the premium ; and where exactness cannot be reached, it should be approached as nearly as possible. In addition to this, the claimant for the premium should be required to give a full and detailed account of his cultivation, the nature and condition of the soil, the manures used, quantity and kind, the quantity of seed, the kind of seed, its preparation and time and manner of sowing, the after-cultivation of the crop, the mode of harvesting, the use and value of the crop, the whole expenses, and every important circumstance connected with it. So also in regard to dairy-produce, or the rearing of live stock, the whole history of the management and manufacture and preservation of the former, and the origin, good qualities and treatment of the latter, should be given before a premium should be conferred. I believe this is not done.

In regard likewise to the presentation of live stock for premium, it seems to me, that the particular history of every animal should be given before the animal can claim a premium. If a milch cow is offered for premium the claimant should be required to state her age, and parentage ; the qualities on the side of the dam for milk or butter, if they can be ascertained ; the race by which she was sired ; the mode of rearing her ; the time of coming in with her first calf ; the number of calves she has had ; how her calves have proved if they have reached an age to be tried ; her milk, its amount in any twenty-four hours, or week, or month, in pounds or in cubic measure, and whether ale or beer measure ; the amount of cheese made from her ; or the amount of butter in any given time, or from any given quantity of milk or cream ; and precisely the mode of her having been fed during the time ; and how long she remains in milk. On these and other particulars exact information should be sought and required. So likewise in regard to a bull presented for premium, his history and pedigree should be required ; and, if of an age to be ascertained, the character of his stock should be reported ; their growth, thriftiness, their feeding or milking qualities.

No fatted animal should receive a premium unless his age, his

weight, his gain for six months or a year, his mode and cost of feeding are all given. No male animal of any kind offered as valuable for propagation and so deemed by the committee, should receive a premium unless security is given that he shall be kept in the county for a certain length of time for the benefit of the stock. I could not learn that any such requisitions were made. It was said that such requisition would diminish the competition ; and that the premiums were not large enough to compensate for the trouble it would impose upon the competitors. In regard to the latter objection, reduce the number and increase the amount of premium. As to the former objection, if such requisitions as are here suggested are not complied with, the objects of the public bounty are not attained. Premiums in such cases are not intended to reward the efforts of industry and skill excepting as such rewards are adapted to excite the industry and skill of others. They are designed to stimulate to trials and experiments in order to ascertain or demonstrate what can be done ; and secure for others the benefits of such experience by showing *how* things can be done. A premium for example is offered for dairy produce, for amount and quality. A claim is made on account of an unusual quantity and extraordinary quality. The fact of an unusual quantity being obtained is important as showing what can be done ; but it is even more important to know how it was obtained. If a premium is given for its superior quality, the principal object of the premium obviously is to obtain for the agricultural public a knowledge of the method by which such excellence can be attained.

It is an observable fact in the reports of the committees of the past year, at the last cattle-show, in respect to crops for which premiums were awarded amounting to the large number of thirty-nine, there is not a single specification of the quantity raised to the whole field or on an acre, excepting as relates to the products of some three fourths of an ounce of mulberry seed ; nor the least intimation of the condition of the land, the manures applied, the seed sown, the mode of cultivation and many other particulars from information in regard to which the farming community might derive the greatest advantage ; and indeed the precise advantage for which the premium was designed.

So likewise in regard to animals with the exception of some cattle, sheep, and swine presented merely for exhibition from New York and Vermont, there is not a single instance in which any ac-

count is given of the origin, stock, weight, mode of raising, mode of feeding, quantity of produce in milk, butter and cheese, and in truth the proper object of such premiums, the extending of practical information of which others might avail themselves, is not at all attained. This is a material omission, which, I can but hope, a society so eminently distinguished for its agricultural enterprise and improvement as this, will see in its just light.

I shall take leave farther to suggest, that in my opinion, the subjects of premium proposed by the Berkshire Agricultural Society, are too limited, and might be extended with great public advantage.

At the commencement of the institution, it appears, they began with a special donation for the best farm—that is, in their own words ; “for the best cultivated and organized farm, the best arrangements as to economy and cost of buildings, fences, farming utensils, farm and fold yards, and other conveniences comprehending animals, and the best systems of rearing and breeding, and the management of manures, \$35.” This proposal seems to have been immediately discontinued ; no decision upon it is recorded, and it does not appear to have been renewed.

Farm-management would be a very proper subject of premium. But when it is proposed that it should embrace so great a variety of matters as it is generally supposed to comprehend, and as would seem to be expected in what should be considered a pattern-farm, few farmers have the courage to enter the lists. Few or no farms combine that variety of husbandry, which is thought to be expected by the society, in any farm offered for its honorary notice. Indeed a large portion of our farmers are so restricted in their means, and have so much to do to sustain their families, and in general no spare capital to invest, that few ever aim at what may be called completeness in farming. Instead, therefore, of requiring for premium what may be called a complete system of farming, or domestic management ; it would be advisable to offer premiums for excellence or distinction, skill, judgment, labor and success, in specific branches of husbandry. The great agricultural interests of Berkshire, are, for example, the sheep and the dairy husbandry. Let as large a premium as can be afforded, be given to the best management in these departments.

Let a standing premium be offered for the best sheep-farm, and let the requisitions for success embrace all the items connected with this subject on which information is most desired and needed ; as for example : the number of sheep kept should not be less than —, and the account required by the board should embrace their whole history and management ; their kind ; the quality of their wool ; the amount of wool to a fleece ; their cost of keep ; their feed ; the kinds of feed ; the quantity required to any given number ; the value of hay, straw, Indian meal, oil meal, potatoes, turnips, carrots, cabbages ; the number pastured on an acre ; the value of pasturage ; the average number of lambs raised to any number of ewes or any mixed flock ; the number of bucks required to a flock ; the time of lambing ; the mode of managing sheep at the time of lambing ; the comparative value of ewes and wethers ; the utility of salting or withholding salt from sheep ; the age to which sheep may be advantageously kept ; the time of shearing ; the mode of washing sheep ; the mode of preparing the fleece for market ; the loss in weight, if any, which the fleece suffers from keeping ; comparisons of profits or advantages among the different breeds ; the results of crossing with different breeds ; the raising of early lambs for market ; the fatting of wethers for market ; the most eligible condition, age, modes of feeding, and kinds of feed ; the proper construction of sheep-pens, racks, mangers, cots, houses ; the comparative advantages or disadvantages of housing or exposing sheep ; the ordinary diseases and accidents to which sheep are liable, and the remedies or preventives ; and many other particulars, which are important, and would naturally suggest themselves to any practical inquirer.

The next subject of premium might be, for example, a dairy-farm, whether of butter or cheese, and this likewise should embrace its entire management. The number of cows should not be less than —. The competitor should be required to state their number, age, breed ; whether raised or not by himself ; mode of raising calves ; feed of cows ; pasturage ; value of land for pasturage ; number of acres required for a cow ; winter-feed ; hay ; corn-fodder ; vegetables : such as turnips, carrots, parsnips, pumpkins, Indian, rye, oat, or oil meal ; their quantities and comparative value from actual trial and observation ; cost of feed ; pounds of hay or vegetables consumed in any given time ; trials of cooked or uncooked

feed ; of simple or mixed ; cut or long feed ; time of milking ; management of milk ; setting of milk for cheese ; mode of preparing and keeping rennet ; of breaking and draining curd ; of pressing ; best form of press ; time the cheese is kept in press ; coloring cheese : anointing cheese ; capping or covering cheese with cloth ; quantity of milk required for a pound of cheese ; mode of sending cheese to market ; loss in weight by keeping ; value of whey for swine ; butter from whey ; quantity obtained and uses to which applied ; number of swine kept compared with number of cows ; number of hands required in milking a given number of cows ; female help required, and cost of such help in making and managing the cheese. So likewise in regard to a butter-dairy, it should embrace every important particular in the management of the stock or the manufacture of the produce—as for example, in addition to the above as far as they are applicable to butter, all the particulars should be required as to the mode of salting the milk ; the kind of pans, whether earthen, wood, or metal ; whether the milk be scalded or not ; how long allowed to stand before it is skimmed ; whether butter be made from milk or cream, and comparative advantages of using either ; temperature of the cream when churned ; usual time of churning ; kind of churn ; cream, how kept ; milk-room or cellar ; deep or shallow pans, and which most eligible ; advantages of putting water in milk when set, if any ; of freezing milk, if any ; butter, how worked when taken from the churn ; salt used ; quantity and kind ; modes of preparing butter for market ; of packing butter for keeping ; trials of the butter ; qualities of the milk of different cows, by a lactometer or by weight ; quantities of milk or butter made by individual cows ; quantity of milk or cream required for a pound of butter ; and in all cases of application for a dairy-premium samples of butter and cheese ; and of a wool-premium, at least a whole fleece properly done up to be sent for the inspection of the Board.

There are other subjects of premium of the highest interest and utility ; premiums which should apply to matters of an experimental character. The best experiment in fattening swine, with a view to ascertain the comparative value of roots or grain, or different kinds of roots and different kinds of grain ; the age at which they are best fattened ; the gain in pastures, the gain in sty ; upon cooked food,

upon raw food ; the average gain per day, per week, per month ; the best construction of a sty ; the best modes and machines for cooking food for swine ; the diseases and accidents of swine ; the cost, and the profit and loss of such experiments. All these are matters on which information of an exact and authentic character is greatly needed ; and the obtaining of it would constitute a very proper subject of premium. So also the best experiments in raising early lambs, and managing ewes ; in raising calves and young stock, and in fattening cattle, with all the particulars and details incident to those operations, being made matters of premium, might elicit the most valuable information.

The application of manures, the composting of manures, the comparative efficiency of different kinds of manures, with exact records and observations of their application, and their particular results on different soils, are subjects on which information, practical knowledge, is greatly desired, and should be sought after by every practicable mode.

I might proceed to other matters of inquiry worthy of being subjects of premium with this enlightened and enterprising society. But after these suggestions it may be best left to their own judgment. The great object of all agricultural premiums should be to awaken agricultural experiment and enterprise, in cases where information is most needed ; and to obtain that information in so exact, detailed, practical and authentic a form that it can be made at once available to all the farmers in the county. This rule being made paramount, the lists of premiums in all our agricultural societies might be amended and enlarged ; and a strong spirit of inquiry awakened by the objects proposed, and the particular form of interrogatory in which these proposals should be presented.

I know I shall not give offence to the public-spirited and intelligent farmers of the Berkshire Agricultural Society in directing their attention to these points, which I do with all possible respect.

The practice of giving the premiums in some durable form of plate, and of announcing and bestowing them in public, is a peculiarity of arrangement highly to be approved. It creates a strong interest and excites a noble emulation. The usefulness and permanency of the article of premium greatly enhances its value. I was often, in my visits in the county, delighted with seeing these honorable re-

wards, in the form of spoons, or tumblers, or cream-pots, brought out ; in remarking the honest and laudable pride with which they were exhibited ; and in the agreeable reflection that they would go down as valuable heir-looms to other generations and stimulate their generous ambition. Agriculture in all its moral aspects recommends itself to the regard of every good mind. Emulation in this business awakens none of the bad passions, which are so often engendered by rivalry in other departments of life. One man's success in agriculture never injures his neighbor ; but always tends to the general benefit. There is in agriculture no monopoly of improvements and advantages ; and every effort, discovery, experiment, or invention by which the improvement of the art is assisted, its respectability advanced, and its productiveness increased, is a direct, substantial, and permanent benefaction to a town, to the country, and to the world.

XIV. MISCELLANEOUS MATTERS.

Mount Washington at the south-western extremity of the county and of the state, seen in almost any aspect, is a noble elevation ; and as you first come in view of it on the road from Stockbridge to Great Barrington, presents an object of peculiar beauty and grandeur. The ascent of this mountain either from Guelder Hollow on the north-east, or the beautiful valley of Kopeck on the west, is long but not difficult ; and after having ascended about two miles you reach an extended area of rolling country surrounded on three sides by a line of different summits, which appear from several points of view below as forming only a single prominence. The whole mountain is comprehended in the township of Mount Washington ; and in this area there are some valuable farms, mainly devoted to the grazing of cattle and the sheep husbandry.

1. MANUFACTURE OF CHARCOAL. The growth on Mount Washington is principally chesnut and white birch with some maple and oak. A great business of the inhabitants on the mountain, and of many persons in the neighborhood, is the conversion of this wood

into coal of which 100,000 bushels are stated to be annually made. Two and a half cords of wood are required to make 100 bushels of coal. By good management two cords will produce 100 bushels. The wood standing is valued according to the accessibility of the situation, at from 50 to 75 cents per cord. A kiln of a common size contains from 25 to 30 cords. The chopping of two cords for a kiln is considered a day's work for a man. Collecting and drawing together on good ground requires five days. The covering of a kiln requires three days' work. The burning of a kiln is twelve days' work. The coal brings $12\frac{1}{2}$ to 13 cents at Hudson, about 24 miles distance and $5\frac{1}{2}$ to $6\frac{1}{2}$ at Riga Iron Works, near the northern line of Connecticut. Many farmers engage in it only in the intervals of their farm-work. One farmer in the neighborhood made the last year 1200 bushels ; and another made and sold coal to the amount of six hundred dollars, which was a convenient and pleasant item in the products of his year's labor.

An experienced observer and farmer, who has lived under this mountain for nearly half a century, says "that the chesnut wood on land where it is cut off will replace itself in about thirty years."

2. MARBLE QUARRIES. The marble quarries in Sheffield are well worth a visit. Here are obtained the stones for the Girard Orphan College in Philadelphia ; and the works are now prosecuted with great spirit and labor. The blocks for the columns are to be of an average measurement of six feet in diameter ; three feet in thickness ; to be rounded and rough hewn. The undertaker pays the workmen at the rate of 130 dollars per block when fitted for transportation. The distance of land carriage to the Hudson is 24 or 26 miles. The cost of each of these blocks when delivered in Philadelphia is 500 dollars. They are taken by ox-teams over the mountain about five miles ; and then by horse-teams to the river. They are ingeniously raised, and suspended under wheels of large diameter and great strength. Seven tons is not an uncommon load ; 13 tons have been taken at a time. After the block is split from the quarry one man is occupied about three weeks in rough hewing it. They can now reach the rail-road from Hudson to Stockbridge in a distance of a few miles ; and will probably use this method of transportation. The number of horses kept for the conveyance of the stone,

nine pairs of horses being not an infrequent team, and the men employed in quarrying the stone, have made large demands for agricultural produce. In looking at the facts in this case, it is curious to observe the chain of connexion running through the multiplied and ramified interests and relations of human life ; how actions and affairs of remote countries and distant times spread their roots in every direction, and penetrate to a wide extent of time and place. Thus the revolutions in St. Domingo, which occurred nearly half a century since, and first laid the foundation of the mammoth fortune of this Philadelphia merchant, are now setting in motion the industry and increasing the comforts and wealth of the farmers of Berkshire ; and promise to extend a beneficent action and influence upon the intellectual and moral interests of mankind through the generations of all future time. So full of importance and pregnant with incalculable consequences is every event and action in human history ; a mixed web, whose thread Omniscience only can trace and unravel.

3. **NATURAL SCENERY.** The natural scenery of this county combines, in a high degree, the beautiful, the grand, and the picturesque. There is an intermingling of so much that is charming and tasteful in rural life with so much that is lovely, elevating, and magnificent in the aspects of nature, that a benevolent and philosophic traveller, in winding his way through the favored valley of the Housatonic, finds his imagination aroused to its highest capacity of enjoyment, and his benevolent and grateful affections continually warmed and expanded. I have a strong faith in the influences of natural scenery upon the mind and character. The grandeur of nature inspires nobleness of thought ; and lofty thoughts bring in their train noble and comprehensive affections. The sublimity of a towering mountain makes the bosom heave with kindred emotions ; and a prospect, which is bounded only by the horizon, gives an enlargement of mind, which spreads by sympathy into every other department of thought and feeling. What is immense and comparatively limitless in nature powerfully stimulates the sentiment of religious veneration in the heart ; and by a natural process conducts the mind to the contemplation of the infinitude, the power, and the perfection of the Creator.

It is among these high hills and mountains, where men are trained in the habits of simple life and of self-reliance, that the spirit of free-

dom and independence may be expected to linger and retain a home, if she should be put to flight in those parts of our country where, among a crowded population, the low and stagnant air is poisoned by avarice and sensuality. When driven from every other part of Europe, she took refuge in the mountains of Switzerland. Her flame could not be quenched even among the glaciers of the Alps. It burnt brightly in the bosom of the brave mountaineer, who, in looking from his eyrie-nest upon the broad expanse below, above, and around him, felt that liberty was the proper element of the human soul. There, under this generous impulse, was raised that beacon-light of liberty, which will serve as the signal of defiance and triumph to the oppressed ones of the earth in all coming time. The county of Berkshire is distinguished by a highly cultivated, intelligent, active, enterprising, and truly republican population. They owe it to the kindness of divine Providence, which has cast their lot in a signally favored location, to encourage and stimulate to the highest degree, among themselves, the spirit of agricultural, intellectual, moral and social improvement.

4. THE GIANT'S STAIRCASE. Among objects of natural curiosity, there is one in the south-western part of the county, but little known even among the inhabitants, which will amply repay the labor and time required to visit it. It is on Mount Washington and is designated by a vulgar Dutch name, which no one who understands it, must ever be asked to interpret. Until a more classical name is invented it may be called the Giant's Staircase. It is a deep and tremendous chasm or cleavage in the rocks on the western side of Mount Washington, which combines much that is grand and terrific ; and is destined to become an object of great resort to the lovers of the wild and romantic in nature. In the spring of the year, the waters, from the line of summits before described, collect in the central area and uniting their streams force themselves in a torrent by several successive leaps, and down successive steps through this tremendous chasm in the rocks into the Kopeck valley. I visited it late in summer when the water was low and the stream small ; but it was then exceedingly striking and beautiful. The lower fall where the silver cascade descends perpendicularly in a glittering pillar of foam, about seventy feet, resembling the inverted plumage of a bird of para-

dise, only of brilliant whiteness and filled with gems, is seen, to the best advantage from below. The passage through the chasm, where you are compelled to creep over an abyss of terrific depth, is in its present condition sufficiently startling and perilous ; and not to be advised until some means of security are furnished other than a bridge of two decayed saplings extended over this chasm. But the passage may at a small expense be made secure ; and will afford to those who have a taste for such exciting objects great delight. The lofty arched chamber of great dimensions, about mid-way of the passage, is very grand. Several intelligent writers have pronounced the Giant's Staircase as an object of curiosity, worthy to be associated with some of the most picturesque and sublime objects in nature, which are to be found in our country.

XV. DESIRABLE AGRICULTURAL IMPROVEMENTS.

1. AGRICULTURAL CAPACITIES OF BERKSHIRE. The county of Berkshire is eminently designed for an agricultural county. It abounds in excellent and permanent water-powers, and is already thickly sprinkled over with manufacturing villages. These establishments, as far as they call upon the farmer to supply from his industry the raw materials of their fabrics tend directly to excite and reward that industry. While they withdraw some considerable portion of the population from the labors, who are nevertheless to be sustained by the products, of the field, and introduce a considerable population from abroad, they present a quick and the best of all markets, a home-market for his produce. Besides this, to a large portion of the county some of the largest markets in the country are directly accessible. The farmer in Berkshire raises nothing worth raising for which he cannot find an immediate sale. The soil and climate are favorable to cultivation. In ordinary years wheat is successful ; oats are abundant ; potatoes and vegetable esculents yield an ample return ; and with the exception of what are emphatically termed the cold years, Indian corn has succeeded as well as in any part of the state. Rough

as some of the land is, there are few cases in which, where it can be ploughed at all to advantage, a pair of horses will not plough more than an acre per day. The sheep husbandry has been pursued with great success ; and the best breeds of fine-wooled sheep are to be found here. The dairy produce of many of the farms is not surpassed by any accounts of other parts of our country, or of foreign countries, which I have been able to obtain. It will be seen likewise from the statements of the farmers of the county themselves, and those certainly among the most intelligent and practical, that there is no crop well cultivated, which does not yield an ample return and compensation to labor.

2. **EXCLUSIVE HUSBANDRY.** Yet with all this it must be admitted that the agriculture of the county in extent and productiveness is far below what it should be. As well as I could learn, Egremont is almost the only town in the county, which raises not only its own bread but has some for exportation. Vast amounts of flour, grain of various kinds, pork and dairy produce are brought into the county from the neighboring states of New York and Vermont. It was asserted as a fact, and if so it deserves notice, that two years since some families in one of the best towns in the county were without bread of any kind for a time from the impossibility of obtaining it. They were persons for example who worked for the large wool-farmers. They asked for money for their labor ; but money was not to be had because the clipping of wool, owing to the derangements of business, had not been sold. They asked to receive their pay in grain ; but the wool-farmers had abandoned all cultivation for the sheep husbandry. They asked for their pay in pork, but the farmers who raised no grain could raise no pork. Now whether this be a true history or fabulous, it illustrates clearly the error committed in abandoning the production of grain. On a sheep-farm, especially, to neglect all cultivation is evidently throwing away one of the great advantages which would accrue to an arable farmer from the abundant supplies of manure, which the sheep might furnish. It may be said that the manure made by the sheep is applied to the grass lands. But it is clear to my mind that in this way it will produce little profit compared with what would come from using it in a proper rotation of cultivated crops. The same mistake is in some cases made by

the dairy-farmers in abandoning all cultivation for the dairy. Now to say nothing of the advantages to be derived in the support of the stock and the increase of the produce both on the sheep and the dairy-farm from an abundant supply of esculent vegetables and grain ; yet the neglect of the advantages to be gained in such cases from the ample supplies of manure, which might be obtained by proper management, is a great practical error. A stock farm and an arable farm, unless in the most untoward circumstances, should be always conjoined ; and thus the beneficent institution of divine Providence be constantly regarded in causing the earth to be replenished and enriched by its own products. This is one of the beautiful laws in the constitution of nature ; and as certain in its operation as is man's obedience to its dictates. When man performs his part, nature is never wanting in hers.

3. DOMESTIC ECONOMY. In looking over my returns, I was struck with the remark of a man of much practical wisdom and one of the best farmers in the Commonwealth. He says "that a farmer should produce upon his farm all those supplies for his family, which the farm can be made to yield." In his case this is done within doors and without ; for there the spinning-wheel has not forgotten to turn round, nor the shuttle to speed its flight. In this cottage, whose neat and beautiful arrangements cannot be surpassed, the clothing, the bedding and the carpeting were all the product of their own fields and flocks. I shall not soon forget the unpretending and hearty hospitality of these enviable dwellings. I have slept many a time under a silken canopy, and trodden many a carpet as soft as the pride of eastern luxury could make it ; but never with any thing like the sentiment of honest pride and independence with which I saw here the floors spread with carpets made from their own flocks, which for fineness and beauty the foot of a princess need not disdain ; and on a cold night slept in woollen sheets from their own looms as soft as the shawls of Cashmere ; and wiped my face with towels spun with their own hands from their own flax, of a whiteness as transparent and delicate as the drifted snow. In such beautiful examples of domestic management, it is delightful to see with how limited means the best comforts and luxuries of life may be purchased. Nor were these instances few. The county of Berkshire abounds with

examples of this domestic comfort and independence. Much to be regretted will be the change, which has already invaded many parts of the state, when under the pretence of superior cheapness, these household fabrics shall give place to the more showy but flimsy products of foreign industry ; and the healthy exercise of domestic labor and household cares shall be deemed degrading in our wives and daughters ; and exchanged for the idleness and frivolities of pride and luxury.

I agree entirely in the sentiment above expressed, that every farmer should, as far as possible, supply the wants of his family from his own farm. He should supply himself with bread, meat, vegetables, milk, butter, cheese and clothing, as far as his farm can be made to do it. He can almost always do it at a less expense than he can purchase these supplies. The labor requisite for this purpose may often be given at times when it would not otherwise be occupied ; and by hands for which there might otherwise be no employment. The sentiment of self-respect and self-dependance, inspired by such a course, is a great gain. The satisfaction of eating bread raised by one's own labor is not small ; and various and important moral influences, which I shall not now discuss, render it altogether desirable ; though in some cases the same amount of labor consumed in their production, if applied in other ways, would purchase a larger amount of the same supplies. Though the supply of our own great wants from our own farms might seem, however, in some cases to be a *pecuniary loss*, it is always in the end a *moral gain*, with which the pecuniary loss is not to be put in competition.

4. INCREASE OF CULTIVATION AND PRODUCTS.—The country ought likewise to determine to supply their own wants, by their own labor, and from their own soil. This is the only certain and substantial independence. Instead of being in agricultural produce, an importing, they might become an exporting community, of bread, and beef, and pork, as well as of dairy-produce and wool. Instead of raising one bushel of corn, they should raise ten. Instead of being satisfied with two hundred bushels of potatoes, they ought to raise two thousand, and so in this proportion. The farming in general, excepting some cases of dairy and sheep husbandry, is on too small a scale to afford much profit. In all the statements of man-

agement, addressed to the Massachusetts Agricultural Society, by those who have entered the lists in the competition for the premiums on farms the present year, every applicant, with hardly an exception, seems to plume himself upon the small amount of labor with which he has managed his farm. If the expense of labor is small, compared with the amount of land cultivated, the improvements made, and the products obtained, this may be matter of merit. But if it is made a boast that little labor has been employed, because in truth, little land has been cultivated, and little produce grown, it is rather matter of discredit than of commendation. Agriculture can never be eminently successful in Berkshire, until more capital is employed, more labor expended, and more produce raised. The great object of every farmer, I speak of men who pursue farming as merchants pursue trade, and manufacturers pursue manufacturing, should be to produce as much as they can ; and to spare no labor nor expense, while labor and expense can be profitably applied to this single object of production. The cultivation of esculent vegetables as food for stock, ought to be a prominent object of attention to the Berkshire farmer. The amount of vegetables raised one year by a farmer in South Lee, viz. two thousand bushels of ruta бага, from two and a half acres of land, and twelve hundred of carrots from two acres, and his opinion of carrots as food for stock, as given in page 92 of this report, and the opinion of a farmer in Pittsfield, of the value of vegetables for stock, in page 101, deserve particular attention.

5. COMPARATIVE VALUE OF HAY, VEGETABLES, AND CORN.

—I wish briefly to draw the attention of farmers to the value of hay, compared with other crops, for the feeding of stock. An acre of hay yields one ton and a half of vegetable food. An acre of carrots or swedish turnips, will yield from ten to twenty tons ; say fifteen tons, which is by no means an exaggerated estimate. It has been ascertained by experiment, that three working horses, fifteen and a half hands high, consumed at the rate of two hundred and twenty-four pounds of hay per week, or five tons one thousand and forty-eight pounds of hay per year, besides twelve gallons of oats each per week, or seventy-eight bushels by the year. An unworked horse consumed at the rate of four and one-quarter tons of hay in the year. The produce, therefore, of nearly six acres of land is necessary to

support a working horse by the year ; but half an acre of carrots, at six hundred bushels to the acre, with the addition of chopped straw, while the season for their use lasts, will do it as well, if not better. These things do not admit of doubt. They have been subjects of exact trial.

It is believed that the value of a bushel of Indian corn in straw and meal, will keep a healthy horse in good condition for work a week. An acre of Indian corn which yields sixty bushels, will be ample for the support of a horse through the year. Let the farmer, then, consider whether it be better to maintain his horse upon the produce of half an acre of carrots, which can be cultivated at an expense not greatly exceeding the expense of half an acre of potatoes, or upon half an acre of ruta бага, which can be raised at a less expense than potatoes, or upon the grain produce of an acre of Indian corn, or on the other hand, upon the produce of six acres of his best land in hay and grain ; for six acres will hardly do more than to yield nearly six tons of hay and seventy-eight bushels of oats. The same economy might be as successfully introduced into the feeding of our neat cattle and sheep.

These facts deserve the particular attention of the farmers who are desirous of improving their pecuniary condition. It is obvious how much would be gained by the cultivation which is here suggested ; how much more stock would be raised ; how much the dairy-produce might be increased ; and how much the means of enriching the land, and improving the cultivation, would be constantly extending and accumulating. But when we find on a farm of two hundred acres, that the farmer cultivates only two acres of potatoes, one acre of ruta бага, and perhaps a quarter of an acre of carrots, we call this "getting along," in the common phrase ; but we can hardly dignify it with the name of farming. I am aware that labor of a proper kind is in many cases difficult to be procured, and with our habits, as difficult to be managed. Farming, likewise, can in few situations be successfully managed, unless the farmer has capital to employ, equal at least to one year's manure and one year's crops. A large portion of our farmers, also, from the nature of their habits and style of living, are so prosperous and independent, that they have no occasion to extend their cultivation beyond what it now is, in order to meet their wants ; and to incur all the trouble, vexation, and risk of

employing more labor, expending more capital, and increasing their cares.

But it is not fair to produce such instances as any examples of the profit or unprofitableness of husbandry, when carried on, as all other branches of business, to be successful, must be carried on, with intelligence, skill, industry, enterprise; and all the capital and all the labor which can be advantageously employed in it. I will not, however, anticipate such general views of the subject, as I propose to take in the retrospect of the whole survey.

6. **APPLES.**—I should recommend strongly to the farmers of Berkshire, the cultivation of apples. The orchards are comparatively few, and many have been neglected from the best of motives, an unwillingness to favor the facilities of intemperance. But the value of apples for fattening pork and beef and even for milch cows, so well established by innumerable experiments, and in some cases rated as highly as potatoes, recommends them most strongly to increased attention and universal cultivation. The borders of our fields may be lined with them; the road sides may be planted with them; they may be scattered over our pastures, with little or no injury to the crops or the pasturage, if properly arranged.

7. **RAISING OF LIVE STOCK.**—The raising of early lambs for the New York market, and of fattening mutton, may be made sources of much profit to the Berkshire farmers; but many important facts which I have on this subject, will be brought into another report.

Great success has attended the raising of neat stock in the county, and finer stock of the kind, principally, though not entirely of the Devon blood, than I found on the farm of George Hull, of Sandisfield, and John M. Hurlbut, of Great Barrington, is seldom to be seen. They evince the very best management. I might mention other cases; and of course in my excursions I can have seen but comparatively little of what exists there; but these examples recurred strongly to my recollection. These gentlemen are well satisfied with the profits of their stock-husbandry; and the facts prove that the raising of stock in Berkshire, with proper judgment in the selection, and care in the management, would afford an ample profit. The Shakers have been eminently successful both at Tyringham and Han-

cock, in raising stock. Attempts have been made at crossing the North Devon with the Improved Durham, on the farm of the former gentleman at Sandisfield, and it is said a superior milking stock has been obtained. I have known other instances of this same cross, with like success ; and in some parts of England it has been greatly commended. The great difficulty to be contended with in the introduction of the Improved Durham Short Horns into our state, will be found in the expensiveness of their keep, and the care which they require. It is universally admitted by their warmest friends, that they consume much more food than our common stock ; and cannot flourish under exposure, and the neglect with which our stock is usually treated.

Attempts have been made, likewise, in Otis and Sandisfield, to introduce the long-wooled sheep, the Dishley or New Leicester. Four bucks of this variety were exhibited at the cattle-show, in Pittsfield, the last season ; and the joint live weight of two of these animals was 640 lbs. A cross between the Leicester and the Merino has been tried here, and is favorably reported. The experiment of thus mixing the long and the fine and short wools together, has heretofore been attempted. The first and second crosses have given satisfaction ; afterwards it has not been approved. All highly bred animals are of tender constitution, and require great attention to keep up the improvement. A cross of the Dishley or Bakewell with the large sheep of our native stock would be an undoubted improvement.

8. COMPOST AND LIQUID MANURES. Manures are the very sinews of agriculture ; its food ; its life-blood. To this matter the attention of the farmers of Berkshire cannot be too strongly directed. I have spoken urgently on this subject in another place ; but I am extremely desirous that the farmers should be impressed with its importance.

It is well established that all animal manures have most efficacy when applied in the greenest state. They are then most active ; and their chemical effects upon the soil are immediate and powerful. In a direct application to the soil, however, they cannot be very thoroughly intermixed ; and on this account, without question, they are less efficacious than they would be, if uniformly distributed and thoroughly incorporated with the earth. To effect this object in the

best manner it is desirable to form them in compost heaps, with other substances ; mud, scrapings of yards, scrapings of roads, sods or decayed vegetable matters of every description ; and even simple loam or mould, or any substance which will act as a retentive absorbent. Thus compounded the liquids of the manure will be retained and the escape of the valuable gaseous effluvia prevented ; and by being thoroughly and equally intermixed and diffused, the whole mass becomes a valuable and efficacious manure. The amount of manure in this way is greatly increased ; and it is believed, that one part of green animal manure combined in this way with two parts of mould, swamp-mud, decomposed peat, and even some portion of clay, will prove quite as serviceable as if the whole mass were animal manure applied in a raw and unmixed state. Some intelligent farmers maintain that the proportion of animal manure or dung requisite to impregnate a large mass in compost is much less than I have allowed. This can be always favorably done in a well constructed barn-yard. The bottom of a barn-yard ought always to be kept well covered with loam or mud, or other matters to absorb the liquids of the yard. But it may often be done to advantage, where the manure on a field designed to be cultivated is seasonably carried out and mixed with mould obtained from the headlands to form the heap, which being turned over and worked up once or twice, will then be fit for use.

There is another matter, to which I invite the attention of the Berkshire farmers ; that is, the saving of liquid manures. In the best districts on the continent of Europe, the liquid parts of manure are considered in every respect equal to the solid. There provision is made for saving and compounding them with the greatest care ; in stone and water-proof vaults formed under their cow-houses. In our dairy districts especially, where large herds of cows are kept, a great amount of this manure might be secured by vaults, formed under the stalls with spouts leading into them. With a view to the same object likewise, the cattle instead of lying in the yards at night, should be always tied in the stalls. If the barn is properly ventilated, and the stalls littered, they will lay as comfortably and securely as in the yards ; and the saving of manure would much more than pay for any extra trouble, which it might be supposed to involve. These are homely subjects but as important as they are homely. Doubling our manures is quadrupling our crops ; and whoever will look with disdain

upon a manure-heap is indifferent to some of the most wonderful and beneficent operations of the divine Providence ; and to the most remarkable and instructive lessons of religious philosophy.*

XVI. MACHINERY.

1. **DRILL-BARROW.** A useful drill-barrow has been invented by Samuel H. Bushnell of Sheffield, of a simple construction, and small expense, by which the sowing of small seeds is well and expeditiously performed. Indian corn may also be planted with it. A good one has likewise been made by Allen C. Metcalf of Lenox, both of which have received the honorary notice of the agricultural society.

2. **THRESHING-MACHINE.** The threshing-machine in general use through the county is one made in Hillsdale, N. Y. I was not able to learn, whether it was patented or not ; or any particular name by which it is designated. It performs its work well and with despatch. It is moved by three horses or by two yoke of oxen. The thresher is placed on the barn floor, and is connected by a belt with the moving power, to which the cattle are attached, in the yard. The whole can be put into a small wagon and easily conveyed from place to place. The cost is 75 dollars. With proper attendance, I was told that 120 bushels of wheat or 300 bushels of oats might be threshed by it in a day. The 300 bushels of oats seemed to me a large statement ; and of course it must take several assistants to hand and take away and tie up so many sheaves.

3. **SMOKE-HOUSE.** Moses Spurr in building a smoke-house, separated it into two parts by a brick partition, with openings in the partition to admit the passage of the smoke. The meat is hung in one apartment ; and the fire is made in the other. In this way the bacon or meat is thoroughly smoked without any danger of dropping or dripping into the fire, or of being injured by hanging too near the

* Appendix G.

fire. This is a small matter, but deserves notice. Many of the best conveniences of life are little matters ; and any one can make an egg stand on the small end after being shown how.

4. WATER-WORKS. The barn of Cornelius Bassett at Lee, whose farming is highly creditable to him, stands on a side hill near his house, at a distance of perhaps thirty or forty rods above a small stream, which flows at the foot of the hill. On this stream he has erected a wheel, which carries a forcing pump ; and through logs the water is thrown in a steady stream directly into his barn-yard. This is a miniature of the Fairmount Water-Works on the Schuylkill ; and a pleasing and useful operation.

XVII. CONCLUSION.

I am unwilling to protract this report, though I have necessarily passed over many things deserving of notice, and have done imperfect justice to subjects which I have treated : but I have the less reluctance in the case, from the fact, that in other reports, should the Government deem the survey worthy of a continuance, I shall have opportunities to recur to them.

I cannot close without expressing my pleasure in witnessing the universal prevalence of a spirit of improvement throughout the country. I should do serious injustice to my own feelings if I did not express, likewise, my grateful sense of the kindness and courtesy which I every where experienced ; my high appreciation of the many valuable acquaintances and friendships, which I have formed ; and my sincere respect for a people eminently distinguished by that intelligence, refinement of manners, order, and good morals, which constitute the honor and happiness of the social state.

APPENDIX.

[A.]

METEOROLOGICAL TABLES.

I—*Letter from ALLEN C. METCALF, of Lenox, to the Commissioner of Agricultural Survey.*

LENOX, *January 22, 1839.*

MR. HENRY COLMAN :

Dear Sir,—In compliance with your request, I now proceed to give you a recapitulation and results of my Meteorological Journal for the years 1837 and '38, together with some miscellaneous observations connected with it, relating to the progress of vegetation in the spring and summer—the time of sowing and harvesting crops, &c. &c.

In reference to the place at which these observations are made, I would state, that my location, as you know, is on elevated ground, not subject to the scorching heats of summer, to which many places are exposed, nor to the extremes of cold in winter, it being somewhat protected by surrounding trees. I have found, from observation and experiment, that in very low situations the mercury indicates greater degrees of heat and cold than in more elevated, so that I consider my situation favorable for obtaining the true *medium* temperature.

LATITUDE AND LONGITUDE OF LENOX.

Lat. 42° 18'—Lon. 73° 20'.

METEOROLOGICAL OBSERVATIONS FOR 1837.

*Mean Temperature and range of the Mercury in each month. Weather.
No. of Days.*

	Highest.	Lowest.	1st $\frac{1}{2}$ mean.	2d $\frac{1}{2}$ mean.	Monthly mean.	Whole range.	Fair.	Cloudy.	Rain.	Snow.	Gauge of water in inches and 100ths.	REMARKS.
Jan.	47	-12	15.39	17.63	16.51	59	11 $\frac{1}{2}$	15		1 $\frac{1}{2}$	1.53	
Feb.	46	-12	16.33	20.13	19.40	58	8	16	2	2	1.63	Highest degree in the year, 90.
Mar.	54	-10	22.26	31.63	26.94	64	11	12	1 $\frac{1}{2}$	5 $\frac{1}{2}$	1.21	Lowest degree, -12.
April	70	21	36	40.55	38.58	55	11	15	4		2.47	Whole range of the mercury, 102°.
May	65	21	49.21	53.75	51.38	62	15 $\frac{1}{2}$	7 $\frac{1}{2}$	3		6.17	Greatest monthly range, 68.
June	38	47	61.71	59.65	60.70	41	1	11	5		5.65	Mean temperature of the year, inclusive, 41.09.
July	90	48	62.25	61.2	62.75	42	16 $\frac{1}{2}$	8 $\frac{1}{2}$	5		2.62	Warmest day, August 9th.
Aug.	39	44	65.21	61.13	63.17	4	16 $\frac{1}{2}$	16 $\frac{1}{2}$	4		2.08	Coldest day, February 13th.
Sept.	87	32	56.66	52.38	54.02	57	21 $\frac{1}{2}$	7 $\frac{1}{2}$	4		.99	First severe frost in Autumn, September 2d.
Oct.	77	20	49.29	43.16	42.72	57	15	15	4		2.04	
Nov.	73	5	34.66	34.49	34.55	3	12 $\frac{1}{2}$	15 $\frac{1}{2}$	1	1	.85	November the driest, and May the wettest month.
Dec.	56	-7	25.99	19.08	22.53	6	11	18	1	1	2.10	

Total fall of Water, ... 32.17 Inches.

Mean temperature of winter, including December of the last year, ... 20.17	Snowy days, ... 12
Mean of spring, ... 33.96	Prevailing winds,—North.
Mean of summer, ... 62.20	
Mean of autumn, ... 43.76	
Fair days in the year, ... 157	March 30th—Robins first seen.
Cloudy days, ... 157 $\frac{1}{2}$	" 24th—Blue-birds first seen.
Rainy days, ... 36 $\frac{1}{2}$	April 16th—Frogs first heard.
	May 18th—Barn-swallows seen.
	" 19th—Plums and cherries in blossom.

My observations for this year are not as full as will be found in the year 1838.

P. S.—Observations at the thermometer taken at sunrise, and at one, and nine, P. M.

METEOROLOGICAL JOURNAL, LENOX, 1838.

Recapitulation and Results.

Mean temperature, and range of the mercury in each month.					Winds—No. of days—from each point of compass.								Weather—No. of days.							
	Highest.	Lowest.	1st $\frac{1}{2}$ mean.	2d $\frac{1}{2}$ mean.	Monthly mean.	Whole range.		N.	N. E.	E.	S. E.	S.	S. W.	N. W.	Fair.	Cloudy.	Rain.	Snow.	Gage.	
January, .	61	-5	32.53	25.52	29.03	66	2	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	12 $\frac{1}{2}$	$\frac{1}{2}$	9 $\frac{1}{2}$	14	13 $\frac{1}{2}$	2	$\frac{1}{2}$	2.16	
February, .	46	-3	9	10.90	14.14	49	5 $\frac{1}{2}$	$\frac{1}{2}$				2	1 $\frac{1}{2}$	2	15	13 $\frac{1}{2}$	12	21 $\frac{1}{2}$	1.52	
March, .	55	1	31.26	34.54	31.10	54	8	7		4	3	1	8	17 $\frac{1}{2}$	9	$\frac{1}{2}$			.96	
April, .	65	16	31.87	33.33	35.19	49	2 $\frac{1}{2}$	5 $\frac{1}{2}$	$\frac{1}{2}$	3 $\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{1}{2}$	13 $\frac{1}{2}$	15	12	1 $\frac{1}{2}$	$\frac{1}{2}$	1.30
May, .	80	29	46.02	57.25	51.5	51	2 $\frac{1}{2}$	4	2			1 $\frac{1}{2}$		12	18 $\frac{1}{2}$	6 $\frac{1}{2}$	6		3.94	
June, .	86	50	65.59	66.66	65.85	36	2 $\frac{1}{2}$	3	1	4	2 $\frac{1}{2}$	3 $\frac{1}{2}$	1	6 $\frac{1}{2}$	18 $\frac{1}{2}$	6 $\frac{1}{2}$	5		3.63	
July, .	91	45	71.77	72.42	67.09	46	7 $\frac{1}{2}$	$\frac{1}{2}$		1 $\frac{1}{2}$	2 $\frac{1}{2}$	3 $\frac{1}{2}$	3	12 $\frac{1}{2}$	24	6	1		3.64	
August, .	86	45	67.26	63.63	65.55	41	2	1 $\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	6 $\frac{1}{2}$	2	1	14	20 $\frac{1}{2}$	7 $\frac{1}{2}$	3		7.60	
September, .	77	37	53.10	57.32	55.51	40	4	5	1 $\frac{1}{2}$	1 $\frac{1}{2}$	7 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{1}{2}$	3 $\frac{1}{2}$	16 $\frac{1}{2}$	8 $\frac{1}{2}$	5		6.54	
October, .	72	20	48.60	37.33	42.99	72	$\frac{1}{2}$	2		$\frac{1}{2}$	2	7 $\frac{1}{2}$	3 $\frac{1}{2}$	1 $\frac{1}{2}$	13 $\frac{1}{2}$	11 $\frac{1}{2}$	13 $\frac{1}{2}$	5	1	5.04
November, .	60	0	37.36	24.30	31.03	60	3		$\frac{1}{2}$	$\frac{1}{2}$	11 $\frac{1}{2}$	$\frac{1}{2}$	1	13	14 $\frac{1}{2}$	11	4	$\frac{1}{2}$	3.97	
December, .	40	-2	23.50	19.14	21.32	42	1 $\frac{1}{2}$					8 $\frac{1}{2}$	5 $\frac{1}{2}$	1 $\frac{1}{2}$	14	19 $\frac{1}{2}$	7 $\frac{1}{2}$	4	.75	

Total fall of Water, 41 inches and 35 100ths, snow included.

Whole range of the mercury in the year, ... 96
 Highest degree, ... 91
 Lowest degree, ... -5
 Mean temperature of the year, ... 42.71
 Mean temperature of winter, including December of last year, ... 25
 Mean temperature of spring, ... 40.14
 Mean temperature of summer, ... 66.15
 Mean temperature of autumn, ... 43.07

There have been 203 fair days in the year—114 cloudy—32 $\frac{1}{2}$ rainy—and 15 $\frac{1}{2}$ snowy.

The summer of this year has been most delightful, and the fruits of the earth, particularly *Indian Corn*, have come to full maturity.

Warmest day in the year, July 10th.
 Coldest day in the year, January 31st.

On 100 days the mercury rose to 70° and above—on 36 of which it rose to 80° and above—and on 4 to 90°. At 11 different times it sunk to zero and below.

Lightning and thunder have been noticed on 13 days. First on the 23d of June—last on the 23d September. Prevailing winds N. W.

Miscellaneous Observations.

March 2—The trees beautifully ornamented with frost.
 " 22—Singing of birds first noticed.
 " 23—A foggy morning—first Robin.
 " 24—Harrowed ground ploughed in autumn.
 April 6—Commenced ploughing.

April 7—Sowed seeds in my hotbed—Frogs first heard.
 " 11—Sowed wheat. 12th—Sowed oats.
 " 24—Finished sowing thirteen acres of oats.
 " 25—Deep halo around the sun.
 " 29—A fine soft atmosphere to-day.

Miscellaneous Observations—Continued.

April 30—A sudden change of 30° to cold.	July 5 and 20—Sharp lightning and heavy thunder.
May 1—Sowed wheat. 12th— <i>ditto</i> .	" 26—Have cut twelve acres of hay up to this date.
" 14—Corn planted in various places.	Aug. 4—Harvested wheat sown April 11.
" 16—Sowed wheat.	" 7—Harvested oats sowed April 12, 13.
" 17—Planted Dutton corn, which ripened finely.	" 18—Harvested wheat sowed May 16.
" 22—Plum and currants in blossom.	" 26—Frost in low grounds.
" 23—Lightning and thunder first noticed.	" 29—Finished haying.
" 25—A bright halo round the sun.	Sept. 3—A general <i>white frost</i> .
" 30—Apples in blossom. Set out fir-trees.	" 5—A dense fog.
Planted potatoes 23th, 30th, 31st of May, and 1st of June.	" 13 and 15—Northern lights.
June 4—Apples in full blossom.	" 18—Great eclipse of the sun.
" 18—Chilly east winds.	Oct. 9—First <i>severe frost</i> .
" 26—Sowed buckwheat.	" 31—A <i>light snow</i> .
July 2—A severe thunder-storm in the night.	Nov. 13—Snow.
	Dec. 8—First sleighing.

Total fall of water, in 5 successive years, has been as follows, commencing with 1834,	33.21 inches and 100ths.
1835, ...	40.47 "
1836, ...	49.89 "
1837, ...	32.47 "
1838, ...	41.35 "
Total, ...	197.39 "
Mean fall of water, yearly, ...	39.47 "
Mean temperature of summer, 1837, 62.20—Of 1838, 66.15.	

As to any agricultural experiments of mine, I have succeeded in none worthy of notice that now occur to me, but will say a word concerning the best situation for fruit and ornamental trees, which are subject to being injured or destroyed by the extremes of cold in our latitude.

Since the cold weather of January, 1835, when the mercury sunk to 25 or 30 degrees below zero, and fruit and other trees were destroyed in different parts of the country, I have been led to notice the effects of severe cold upon trees in different exposures, and have found almost universally, that fruit and other trees, standing in sheltered situations, have been killed, when those of the same kind, standing exposed to a free circulation of air, have safely withstood the injurious effects of frost. This has, I doubt not, been noticed by yourself and others; if so, then perhaps my observation will tend to confirm this opinion.

One cause of this is supposed to be, that when a season of warm weather occurs in winter, or early in the spring, (as it often does,) it causes the sap to rise and the buds to swell prematurely in trees standing in sheltered situations—and then a sudden change to severe cold checks this circulation, and freezes the sap in the capillary tubes, thus

destroying the vital principle of vegetation in the tree. So that upon this principle it is advisable to plant such trees in open grounds.

There are undoubtedly other causes of trees in such situations being injured or destroyed when others are not, but which I cannot satisfactorily explain.

With regard to the destruction of the *Borer*, which infests the locust trees, I will merely state the facts of an experiment I made in June, 1836.

In the early part of summer of that year, at the time when the locust is usually growing most rapidly, I discovered that two beautiful trees of the common locust, in front of our house, appeared pale and sickly, and were not growing as others were, or as they had done the year previous; and on examining their trunks I found, to my grief, that great numbers of the borer were committing their depredations upon them, and that unless something could be promptly done to destroy these invaders, I must lose my favorite trees. I immediately took a half pint of spirits of turpentine, *without diluting*, (thinking I would either kill or cure,) and washed the trunks of my trees therewith, at the same time picking out with my knife and killing as many of the insects as could be found. In a week's time, the appearance of the trees was improved, though they did not grow much that year.

The next year I repeated the washing, though no borer could be found, and the trees grew well; and in June, 1838, they were growing as finely, and looked as flourishing, as any other trees.

In case any one should wish to make the experiment upon a large scale, the turpentine might be diluted with *muddy* water, (it would not mix with clear,) and would undoubtedly answer every purpose, and go much further.

It appears to me it would be a public benefit, and conduce much to the advancement of science and the benefit of agriculture, if the Commonwealth should provide for the procuring of meteorological observations, and pay a suitable compensation for performing the labors of such an office. The state of New York employs several such officers, who are connected with the schools and colleges of the state.

If keeping such a journal is a public benefit, why should not our own state patronize the object, and let it be connected with the agricultural, instead of the academical department of science. If any benefit is to be derived from observations on the various phenomena of the seasons, let it be directed towards advancing the interests of the agricultural community. The keeping of such a journal, is necessarily attended with considerable expense of time.

T'at of making the daily observations is but trifling, but the carrying of them out, and obtaining the various results, costs a good deal of time and labor. This, together with the purchasing of suitable philosophical instruments, amounts to quite an item of expense; but if one could receive a moderate compensation for his trouble, he would be induced to make other observations and experiments which might be interesting and useful. As it is, I cannot well afford it. And for this reason, I had discontinued my journal, as you know, but at your request commenced it again, and shall continue to keep it until I hear from you upon the subject.

I would suggest the idea, if any thing should be done by the Legislature on the subject, of having such a journal kept one at Boston, one at Worcester, or Northampton, and one at Lenox. A barometrical table should be kept in the journal.

Please excuse this long document.

Yours sincerely,

ALLEN C. METCALF.

II—TABLE FROM MEMOIRS OF AMERICAN ACADEMY, VOL. IV, PART I.

*Comparative time of Flowering of several Plants in the
Spring of 1817.*

	Williamstown.	Brunswick, Maine.	Montreal, Canada.	Boston.	Albany.	New York.	Philadelphia.
Claytonia Spatulata. Spring beauty.	Apr. 13	.	May 1	.	.	Apr. 20	Apr. 10
Tussilago farfara. Garden colts'-foot.	" 19	.	.	.	.	.	.
Ulmus americana. Elm.	" 20	May 2	" 10	Apr. 20	.	" 11	.
" fulva. Slippery elm.	" 21	.	.	.	.	.	.
Pothos foetida. Skunk-cabbage.	" 21	.	.	.	.	.	Mar. 13
Acer rubrum. Soft maple.	" 22	Apr. 28	" 5	" 22	.	" 11	Apr. 10
" saccharinum. Sugar-maple.	" 22	.	.	.	.	.	.
Sanguinaria canadensis. Blood-root.	" 22	.	" 1	" 19	.	" 26	" 15
Hepatica triloba. Liverwort.	" 23	.	.	" 20	Apr. 17	.	" 6
Caltha palustris. Cowslip.	" 24	.	" 15	May 2	.	" 16	" 22
Alnus serrulata. Black alder.	" 24	May 3	.	.	.	.	Mar. 24
Erythronium americanum. Adder-tongue.	" 26	.	" 14	" 9	.	" 15	Apr. 14
Leontodon taraxacum. Dandelion.	" 30	" 12	" 15	" 4	.	.	" 22
Anemone nemorosa. Anemone.	May 2	" 5	.	" 2	.	" 14	" 15
Aronia botryapium. Shad-flower.	" 2	.	.	" 8	.	" 26	.
Fragaria virginica. Strawberry.	" 6	.	" 13	.	" 8	.	.
Uvularia perfoliata. Bell-wort.	" 3	.	" 15	.	" 13	.	.
Aquilegia canadensis. Columbine.	" 1	.	.	.	" 1	.	.
Pyrus malus. Apple.	" 15	" 29	" 25	" 19	" 15	.	" 20

[B.]

ON RAISING CALVES.

BRAINTREE, *January 13, 1838.*

REV. MR. COLMAN :

Dear Sir,—In answer to your inquiries respecting the mode which I have adopted in raising cattle, I can merely say, that I have, for ten or fifteen years past, preferred to raise calves that come in the fall of the year, rather than those that come in the spring, for two important reasons: the first, and equally important is, the great saving in expense. Those that I have raised within the above time, have not cost me more than one quarter part so much as those that I formerly raised. They used generally to be with the cow from eight to ten weeks. The usual quantity of milk which they took, was about eight quarts per day each; the common price of milk has been twelve and one half cents per gallon, and four cents per single quart, and more sold by the quart than by the gallon. Upon a calculation, you will see, that it would cost about seventeen dollars, upon the lowest price of milk, to prepare a calf to go to pasture; in addition, calves that are raised in the spring, generally come in when two years old, which I think too young; the cows are not so good nor so large, and will not hold out so long, having come to maturity too soon.

Another difficulty which arises from letting the calves take the milk from the cow, is, when you turn them to pasture they are very uneasy, continually bawling after their mother, eat but little, and fall away in flesh, and are often stunted. Those that are raised in the fall or winter, do not generally come in until they are two and one half years old, are much larger, and continue good cows much longer. The expense of raising them in the old way, has been so much, that scarcely a single calf is raised in this vicinity. Consequently our farmers have bought their young cattle from droves from different parts of the country, and have had no opportunity to select the breed, the result of which is a *misérable breed of cattle*. Now sir, the mode which I have adopted, (with great success) is: I take my calves (that come in the fall or winter,) from the cow when three or four days old, (as the case may be;) I take a small quantity of good English hay, and make a tea from it; I add a small quantity of milk, and a very little molasses to it. The

calf drinks it freely, and very soon becomes very fond of it, and having got the taste, will eat hay at three weeks old, with as much eagerness as a calf will usually eat grass at ten weeks old. As they increase in age, I decrease in the quantity of milk, unless I happen to have a large quantity of poor milk. I make the tea pretty strong, and give them about as much as they would usually require of milk, twice a day, with a few carrots cut up fine, and also, as much good hay as they will eat. The hay that the tea is made of is not lost, as the cattle will eat it all. I generally have a kettle with hay in it on the fire all the time; a small quantity of hay will make enough for morning and night. I have been very much indebted to the Hon. John Welles, of Boston, for the breed of my cattle; have had them of him; and without exception, I think his breed of cattle is by far the best in this country. I have found no difficulty in selling my cows, from fifty dollars to a much higher price. I think a calf may be raised till it is ten weeks old, in the manner I have adopted, for the small sum of three dollars—the trouble is but trifling. If the above remarks, or any part of them, are of any service to the public, they are at your service.

With much esteem,

Your friend, and

Humble Servant,

MINOT THAYER.

[C.]

CHEESE-SHELVES.

“Wilbur’s semi-revolving slide cheese-shelves is an admirable contrivance to save labor in the cheese-dairy. By it two men can easily turn twenty-four heavy cheeses in a minute, and are enabled to rub them without their being lifted from the shelves. The model consists of an upright frame, suspended by an axis passing through its horizontal centre; and into which slide eight pair of shelves, the distance of which may be graduated to the size of the cheeses. The cheeses are placed alternately above and below the axis. Slats are fixed upon the

back of the frame to prevent the cheeses falling out when the frame revolves. The frame is made stationary by a pin, and when this is withdrawn, it is made to revolve half round upon its axis, which turns the cheeses. The shelves over them, and upon which the cheeses have lain the preceding day may then be withdrawn, and left to dry till the next day, when they may be returned, the turning process repeated, and the other shelves cleaned and dried in turn. The improvement is a valuable one in large dairies. Henry Wilbur of Richfield, Otsego Co., N. Y., is the inventor."

Extract from a Letter.

"The saving in labor and risk of the cheese are great, and the expense of fitting up a new room on this plan, would not greatly exceed that in common use, as the room may be much smaller. One rack with six shelves, six feet long, twenty-four inches wide, set eleven inches apart, will hold eighteen cheeses weighing from 100 to 140 lbs. each, suspended by a wooden shaft two inches square, resting on two rails extending the whole length of the room, three and a half feet high, or if only a single rack, on two posts; each rack requires about four feet on the length of the rails, to turn well,—and its cost will not exceed six dollars including the materials of which it is made. On this system the cheese dries much faster, as it is turned on to the dry side of the shelf every day, and has a sound and dry rind. He has one set of extra shelves, which are slipped in close above the cheeses before turned, on which shelf the cheeses lay when turned over; the others are then liberated for another rack, and so on through the room. By the aid of these six extra shelves, the cheeses in turning need not fall but a trifle, if any."

[D.]

LETTERS FROM S. L. DANA, M. D., ON ASHES, LIME, &c.

LETTER I.

LOWELL, *February* 16, 1839.

Dear Sir,—You have asked me how the action of ashes, leached, or unleached, whether of wood, peat, or coal, is to be explained on my views of vegetation. The best answer I can give you, is to state what is the composition of ashes, and to glance at my views. By the last, I presume you refer to statements in Prof. Hitchcock's late report. I have there said that fertility depends on salts and *geine*. Without the last there is no healthy vegetation. The great body of the soil, in which salts and *geine* act, is only the comminuted remains of rocks, usually called primitive. We have termed this "granitic sand." We have thus three great, natural divisions of the ingredients of soil: 1st. *Geine*, 2d. Salts, 3d. Granitic Sand. Strictly speaking, we have two classes only, *geine* and salts, for the "granitic sand" is a mass of salts; a mass, in which *silex* acts as an acid, and alkalies, lime, magnesia, alumine, metallic oxides as bases, a mass of *silicates*. I prefer this term to granitic sand, and I shall hereafter use it. Let us now glance at these three divisions.

1. *GEINE*.—To my remarks, already published by Professor Hitchcock, I now add, that *geine* enters vegetables simply as *geine*, or as an alkaline, earthy, or metallic geate, dissolved either in water or in alkali. The organic and inorganic acids and salts of the plant, decompose these varied forms. The elements of *geine*, its oxygen, hydrogen, and carbon, play their usual part in vegetable economy. Acetic, and probably some of the other vegetable acids, do not precipitate the alkaline solution of *geine*. In this case, it may still circulate in fluid form in plants. The earthy and alkaline bases of the geates form the bases of the various salts which plants afford.

2. *SALTS*.—This class includes, first, compounds of *geine*; second, alkaline salts, potash, soda, ammonia, and all their combinations, known by the names of carbonates, sulphates, nitrates, muriates, &c.,

as common salts, soaper's *spent leys*, consisting chiefly of muriate of potash mixed with a peculiar organic compound called glycine, salt-petre, ashes leached or fresh, urine, containing abundant phosphates and ammoniacal salts, soot; containing both ammonia and geine; third, lime, in all its forms, marl, shells, chalk, marble, air-slacked lime, plaster, bones.

3. SILICATES.—To have a distinct idea of this division of soil, let us tabulate the composition of argillite, and of the several simple minerals, whose aggregate composes primitive rocks. Though analyses, imperfect as they are, have not yet discovered phosphoric acid in all these aggregates, yet I doubt not, that accurate investigation will detect its presence in all granitic sand. Phosphate of lime is by no means an uncommon mineral in primitive rocks, and chlorides are widely diffused.

Table of the constituents of the elements of silicated soils or granitic sand.

One hundred parts of	Potash and Soda.	Silex.	Alu- mine.	Lime.	Magne- sia.	Oxide of Iron.	Oxide of Magne- sia.
Argillite, - - -	5 to 7	48	23	4	1.06	-	-
Quartz, - - -	-	93	6	1	-	-	-
Mica, - - -	8 to 9	47	34	-	-	1 to 2	1 to 2
Felspar, - - -	13 to 14	66	19	4	-	1	$\frac{1}{2}$
Hornblende, (including Trap Rocks,) - - -	-	42	12	11	2 to 3	30	$\frac{1}{4}$

Argillite contains notable portions of carbon. The source of this not only in this, but in other primitive rocks, I shall show elsewhere, is the *geine* and *geates*, held in solution in the water, from which these sedimentary rocks were deposited.

Sulphuret of iron is abundant in primitive rocks. Its decomposition produces with the silicates, sulphates of alkalies, earths, and oxides. Keeping in view the remark on phosphates and muriates, and we have then, at a glance, the inorganic elements of all plants.

Burning reduces these constituents to two classes: ashes and volatile salts. The last are found in soot. The ashes are formed of salts and silicates. These vary in quantity and quality, not only in different plants, but, as is well known, in different parts of the same plant. Let us take oak, beech, basswood, birch, as the types of the composition of

hard wood ashes, yellow pine,—(*pinus abies*)—as the type of soft wood ashes ; and wheat-straw as the type of the ashes of the grasses.

The average quantity of ashes, from 100 parts of dry oak, beech, birch, &c., is 2.87. Ashes are divided, by the simple process of leeching, into two parts, soluble and insoluble in water. 100 parts of hard-wood ashes thus afford—soluble, 13.57 ; insoluble, 86.43.

100 parts of the soluble contain :

Carbonic acid,	.	.	.	.	.	.	22.70
Sulphuric acid,	.	.	.	.	.	.	6.43
Muriatic acid,	.	.	.	.	.	.	1.82
Silex,	.	.	.	.	.	.	.95
Potash and soda,	.	.	.	.	.	.	67.96
							99.86

100 parts of the insoluble contain :

Carbonic acid,	.	.	.	.	.	.	35.80
Phosphoric acid,	.	.	.	.	.	.	3.40
Silex,	.	.	.	.	.	.	4.25
Oxide iron,	.	.	.	.	.	.	.52
Oxide Manganese,	.	.	.	.	.	.	2.15
Magnesia,	.	.	.	.	.	.	3.55
Lime,	.	.	.	.	.	.	35.80

Pine,—(*pinus abies*,)—100 parts dry wood afford only .0083 ($\frac{83}{100000}$) of ashes ; of which, 100 parts afford,—soluble, 50 ; insoluble, 50.

100 parts of the soluble contain :

Carbonic acid,	.	.	.	.	.	.	13.50
Sulphuric acid,	.	.	.	.	.	.	6.90
Silex,	.	.	.	.	.	.	2.
Potash and soda,	.	.	.	.	.	.	69.70
Water,	.	.	.	.	.	.	7.90
							100.

100 parts of the insoluble contain :

Carbonic acid,	.	.	.	.	.	.	21.50
Phosphoric acid,	.	.	.	.	.	.	1.80
Silex,	.	.	.	.	.	.	13.

Magnesia,	.	.	.	.	.	.	8.70
Oxide iron,	.	.	.	.	.	.	22.30
Oxide manganese,	.	.	.	.	.	.	5.50
Lime,	.	.	.	.	.	.	27.20
							100.

Wheat straw,—100 parts yield .044 of ashes ; 100 parts of which afford,—soluble, 19 ; insoluble, 81.

100 parts of the soluble contain :

Sulphuric acid,	.	.	.	.	.	.	0.2
Muriatic acid,	.	.	.	.	.	.	13.
Silex,	.	.	.	.	.	.	35.6
Potash and soda,	.	.	.	.	.	.	50.

100 parts of the insoluble contain :

Phosphoric acid,	.	.	.	.	.	.	1.20
Silex,	.	.	.	.	.	.	75.
Oxide iron,	.	.	.	.	.	.	2.50
Lime,	.	.	.	.	.	.	5.80
Charcoal,	.	.	.	.	.	.	15.50

Peat-ashes abounds in carbonate, sulphate, and especially phosphate of lime. I have always traced *free* alkali in peat ashes ; but alkali exists in it, rather as silicate, as in leached ashes. Anthracite coal ashes contain a carbonate of lime, alumina, and oxide of iron. It is good, so far as these abound.

The above are calculated on the analysis of Berthier, who has detected soda in the ashes of ail plants. The elements are stated singly ; because we have thus at one view the amount of each, and, as I shall show, it is the base chiefly which acts. The agricultural value of ashes may be determined by reference to these tables. In what state these elements may be combined in plants, we can only determine theoretically. Thus, the phosphoric acid, by its affinities, would be united in the hard woods as above, with the lime and iron,—forming in each 100 parts of the insoluble portion of ashes, phosphate lime, 5.40 ; phosphate iron, 1.86.

Of the various substances which chemistry detects in the ashes, few probably exist in the living plant, in that state of combination, in which

we find them in ashes. Burning decomposes and recomposes them anew. We are by no means to conclude, because we find various salts in plants, that they existed as such in the soil. Of the soluble alkaline salts, probably none exist in the soil. They are products of vegetation deduced from the composition of silicates and salts.

The composition of the *insoluble* part of ashes gives us nearly the constituents of *leached* ashes. If the soapboilers' process was as perfect as that which the chemist employs—still his leached ashes would show more lime, than the above tables, because he always employs a portion of lime to make his lye caustic. This is a variable portion; whatever it is, it adds so much to the value of the leached ashes. Besides the soap-maker always leaves a portion of alkali, which is combined with the silice. Exposure to air decomposes this, and then the alkali can be extracted by water. This is one great source of the active power of leached ashes. The course of this wonderful power, not only in fresh and in leached ashes, but in some degree in all *salts*, is to be found, in the action of the bases on *geine* and on silicates.

There is one great, simple principle running through all the classes of soils. It is this, *that in all salts and silicates the action of the base is ever the same in vegetation.* The base of the silicates and salts acts always in one uniform mode. Peculiarities of action depend on the *acid* constituent of the salt. Lime, for instance, acts ever the same, whether it is used as carbonate, sulphate, or phosphate, marl, plaster, or bone-dust. The salt is decomposed by the living plant. The various acids combine with the alkalies, as they are eliminated, from the decomposition of the silicates, and the lime, liberated, acts ever as lime. It acts in its *caustic* state, as a converter of insoluble into soluble *geine*. If this does not exist in the soil, all the lime in the world would not cause plants to grow. The base of the lime-salts acts primarily on *geine*, either solving the soluble or converting the insoluble. The same is true of alumine, iron and the bases of all salts. The same general rule applies to all alkaline, earthy or metallic salts and to silicates.

The order in which the farmer may apply salts is the following. Carbonate, phosphate, and sulphate of lime, carbonates, nitrates, muriates, and sulphates of alkalies. No salts, excepting carbonates, can be used in large quantities. The reason is at once explained by the principle of unity of action of the bases. The acid of the salts, eliminated, decomposes the *geates*, rendering the soluble insoluble, the acid combines with any free base, produced from the decomposition of the silicates, and thus prevents that forming soluble *geine*. Having saturated the bases, any excess acts then as free acid, poisoning the

vegetable, as oil vitriol, or muriatic acid would animals. In carbonates, the acid forms part of the food of plants. The alkaline geates are so very soluble, that when alkalies, as ashes for instance, are freely used, we lose a part, by its draining away, or in wet soils becoming too dilute. But a small dose produces all the beneficial effects of a large dose of lime. We have in ashes, not only the alkali to solve geates, but a very large portion of carbonate and phosphate of lime. Experiments are wanting to prove the relative value of lime and ashes. I should not deem it extravagant to say, that a bushel of ashes is equal to a cask of lime. The alkalies and their salts act more powerfully than any other substance, in solving and converting geine. Lime in all its forms ranks next. These produce always decided beneficial effects. The alkalies never fail. Ashes show their effects at once, due to the alkaline part, while their carbonate of lime produces more permanent effect. Lime, from peculiar states of the soil, may not show any immediate good result, but ultimately, this result is sure to follow. Permanent barrenness never is produced by the free use of carbonates. It surely follows the free use of all other salts, yet in small doses, they all and ever act beneficially, whenever their bases, combined with carbonic acid, would be beneficial.

But how do the elements of soil act? As I have stated in the report of Professor Hitchcock, by forming galvanic batteries with the roots of living plants. The most active element in the pile is the root. The soil, like the rocks from which it is derived, is slowly acted on by atmospheric agents. The effect of this action annually is imperceptible.

A single plant in one season will effect a greater amount of decomposition of a given portion of soil, than that produced by all the atmospheric agents in many years. The galvanic agency of plants is not confined to the soil, in immediate contact with their roots. It extends from these, in every direction, to undetermined distances. Hence there is a transfer, as is usual in galvanic decompositions, of substances quite remote from the plant. The whole plant contributes to this galvanic agency. It never exists in full force, perhaps not at all, till the plant has pushed above ground—acted on by air and light.

The soil, as we have explained, consists almost wholly of silicates, though it has been proved, that carbonic acid slowly decomposes these, and an argument, for the mutual action of the elements of silicates, derived from their admitted electrical states, yet the amount of this action is never measurable in one season. Being silicates, they have no tendency to act on each other. We can only excite this action by introducing new elements, salts, which in this sense only, can be said to

be excitants or stimulants. The silicates are the flour, the salts the yeast. The galvanic agency is excited by the salts, but above all, over all, and controlling all, this action of soils is the living plant. The influence of the last unfolds the mystery of the often repeated experiment of growing plants in pure water. Granting the water to have been chemically pure, the galvanic agency of the vegetable would decompose the containing vessel. The most barren sand would be made fertile by living plants. Sand containing no appreciable quantity of geine, may yet from its origin from sedimentary rocks contain carbon. Water it, and grow in it plants. Let these perish. They return to the sand, not only organic matter, the source of geine for a new crop, but various salts, of whose previous existence in the same it required the most delicate chemistry to detect traces. The living plant is a consummate analyst. This is the process nature employs. Mr. Keely, acting on this principle, and following out and assisting the natural mode, has opened the whole soul of raising crops. The memorable experiment of the Haverhill rye-field, ought to be engraved on the thresholds and lintels of every farm-house in the country.* It teaches us that salts, so important in agriculture, are within the reach of every farmer. Every farmer has a lime-quarry on his own land. He ought also to have constantly burning a lime-kiln. The farmer has on his own grounds, lime sufficient for all wants. Let all brushwood, unfit for the kitchen, be burned for the ashes. But let the *soot* too be saved. It is too valuable to be lost in air. Look at its composition as stated by Braconnot.

GEINE	30.70
Extractive matter and nitrogen	20.
Carbonate of lime and traces of magnesia	14.66
Acetate of lime	5.65
Sulphate of lime	5.
Phosphate of lime and iron	1.50
Acetate of potash	4.10
Muriate of potash	.36
Acetate of Ammonia	.20
Acetate of Magnesia	.53
Silex	.95
Carbon	3.85
Water	12.50
	100.

* See Appendix E., page 113, First Report of Agriculture of Massachusetts.

I have nearly finished the analysis of Adams' soil. I will send it to you next week, together with the composition of the substance used by Webster, in Dracut.

With great respect,

I am very truly yours,

SAMUEL L. DANA.

Rev. H. COLMAN, Boston.

LETTER II.

LOWELL, *March 4, 1839.*

Dear Sir—I omitted an answer to one of your questions, in my letter of last week. I know of no particular affinity between plaster, or ashes, and *white* clover. The same crop follows a free use of bone-manure. This effect is due in all cases to a peculiar development of *geine*. This substance is probably, like many other hydro-carbon compounds, an unstable chemical combination, capable of existing in several definite portions of oxygene, hydrogen and carbon. Now each of these may develop the germination of particular seeds. We know that "*fungi*," always germinate best in decaying wood. Always we find crops of "*fungi*," about the decaying stumps of trees. I have noticed that the mops, which have been used for swabbing out vessels, in which cloth has been dyed with madder, when thrown aside in a moist, steamy room, often become covered with beautiful *fungi*. I had occasion last fall, to make a decoction of a large quantity of English Hay. (It affords a permanent yellow, with alumina.) This decoction was made with a portion of alkali, and several times repeated. The hay was then thrown aside in a pile out of doors. In a few days, it was filled in all parts with *fungi*, whose stems and roots were often a foot long, mounting up through the pile, and raising the upper layer of hay in large fork-fulls. Now, both here and in the madder, the seed existed in the vegetable fibre. Its vegetating power was not destroyed even by long boiling. *It required only a particular development of geine, to stimulate the germinative power of the fungus seed.* The exposed boiled hay rapidly developed this peculiar state. Probably the seed, of each class of plants, requires a peculiar development of *geine*. Let us understand, if we can, in what this consists, on what it depends. It may be a state always under our control. If we can always, and at

will, induce the state of geine, best fitted for each plant, then adieu to the doctrine of the necessity of a rotation of crops. The facts are already abundant to support the belief that rotation is unnecessary; and I shall look with great interest for your next report, for a fund of information on this point. That a peculiar state of geine is necessary for each variety of crop, is therefore a point to which the attention of the chemical farmer ought to be especially directed. It is this state, which allows one farmer to raise wheat, while in the same season, with land apparently the same, his neighbor fails.

I send you the analysis of Esq. Adams' soil.* It contains no trace of carbonate of lime, nor of alkaline salts.

Soluble geine	3.9228
Insoluble geine	2.6142
Sulphate of lime	.7060
Phosphate of lime	.9082
Silicates (granitic sand)	91.8488
	100.

The soluble geine of one analysis, 3.6914 grains, afforded

Geine	1.9258
Alumine and oxide of iron	.7715
Phosphoric acid	.2415
Magnesia	.3396
Loss	.4230
	3.6914

I presume that the soluble geine of all soils is similarly constituted. All which I have examined afford these elements. I think you must have misunderstood me in promising a written account of the effects of using the residuum from our yard, by Webster. I know not so much of the effects as you do. It contains a variable portion of phosphate of lime; and its average constitution is sulphate of lime 85, phosphate of lime 15—100.

This refers to the farm of Wm. Adams, Chelmsford, Middlesex Co., noticed in page 97. His farm lies on the Merrimack river and embraces a large extent of alluvial land. On these meadows, as he assured me, he had been in the habit for twenty years past of raising wheat; and that in the course of that time he had suffered only from one failure. He stated likewise that he had never applied any lime to his soil.

H. C.

It can therefore be easily imitated if necessary, by mixing plaster and burned and ground bones in this proportion.

With great respect, I am

Your most Obt. Servt.

SAMUEL L. DANA.

Rev. H. COLMAN, Boston.

[E.]

FEED FOR SWINE.

From Arthur Young's Prize Essays on Rearing and Fattening Hogs.

EXPERIMENT II.

"At the same time (March, 1765,) with the preceding trial, four lots of pigs, that had been weaned three months, were equally drawn from my farm-yard, five in each lot. They were confined as before, each lot to a sty, and cleaned at the same time; their food was as follows:—

- No. 1. Bran (wheat) mixt with milk.
- 2. Boiled Potatoes.
- 3. Boiled Carrots.
- 4. Raw Carrots.

They were kept to this food thirty days, and then viewed them as before with the same person.

- No. 3. Much the best,—boiled carrots.
- 1. Next,—bran and skim milk.
- 2. Next,—boiled potatoes.
- 4. Worst,—raw carrots.

Boiled carrots appeared very clearly on this trial to be an admirable food for hogs of this age;—Boiled potatoes appear also a good food, &c.

EXPERIMENT VI.

The month of December, 1766, twenty pigs, that had been weaned a month, were draughted into four parcels, and kept that month, separately in the following manner.

- No. 1. Boiled carrots.
- 2. Boiled potatoes.
- 3. Boiled turnips.
- 4. Boiled cabbages.

At the end of the month they were turned out and viewed attentively. The result was :—

- No. 1. The best,—boiled carrots.
- 2. Next,—boiled potatoes.
- 3. and 4. Equal,—all nearly dead.

Carrots continue in every trial superior to all common vegetable food. I am not at all surprised at the ill success of turnips and cabbages."

There are many other experiments detailed, giving similar results, of which our limits forbid the insertion.

[F.]

EXPERIMENT WITH DIFFERENT STEEPS FOR SEED WHEAT.

An observing farmer in Lowell, has sent me the results of some experiments on the effects of different steeps upon the vitality of seeds of wheat. In each experiment he took twelve seeds from the same parcel of wheat; and as near alike as he could select them; and after steeping, exposed them in planting to the same aspect and temperature. The heads of the columns will show the number of hours in which each parcel remained in the steep; the figures in the columns, the number of seeds which germinated and came up.

TABLE.

TABLE.

SHEEPS.	No. of Seeds in a Tip.				
	One hour in the sheep.	Twenty three hours in the sheep.	Forty one hours in the sheep.	Sixty hours in the sheep.	One hundred and twenty four hours in the sheep.
Urine, ...	11	0	3	0	0
Soap and Urine, ...	6	7	3	0	0
Salt Pickle, ...	10	3	3	2	1
Salt and Urine, ...	12	2	1	1	1
Water, ...		10			

The preparations of seeds for sowing, and the modes of keeping seeds, are matters of great importance, especially as so many nostrums are given for this purpose. The difficulty of importing mulberry-seed from China to this country, so that its vitality shall not be lost, is well known. Very little that has been imported has germinated, and the most serious and vexatious disappointments have been experienced. Great disappointments have occurred with some persons in their seed-corn. I myself was so unfortunate in one case as to lose three bushels of the seed of the Black sea wheat, from which I had with infinite pains picked out all the oats, cockle, and foul stuff, with which it abounded, by hand, from the man's having taken it without direction or leave, to be passed through a smut-mill, by which operation, I suppose, the skin of the seed was broken, and its vitality destroyed. The experiment above given, is on a very small scale; and cannot be deemed conclusive; but I consider it worth recording; and in the strong hope that it will lead to farther inquiries.

H. C.

[G.]

THE GRAIN-WORM, (*Vibrio Tritici*.)

Extract from an article in the Penny Magazine No. 87, for 1838, on the subject of the Grain-Worm, (Vibrio Tritici.)

Mr. Bauer, the naturalist says, "I have been enabled to ascertain many important facts, respecting the nature and properties of the minute animals engendering this disease. These experiments establish the fact, that the white fibrous substances, within the cavities of the distorted grains, consist of real organized animals endowed with the extraordinary property of having their power of motion suspended for a considerable length of time, and of having it again restored by the mere application of water."

He then goes on to detail some experiments, to show how these worms were propagated, and how he succeeded in inoculating sound grains with them, which I have not room to extract. He adds:

"The fact that at such an early stage of the vegetation of these inoculated seed-grains, such large worms were found, confirms my first supposition, that it requires several generations of these worms to introduce their eggs into the young germens; the large worms found in the substance of the young stem, were undoubtedly some of the original worms, with which the seed-corn was inoculated; for they were on the point of laying their eggs in that stage; and these eggs being propelled by the rising sap a stage further, then come to maturity, and again lay their eggs, and thus progressively reach the elementary substance of the ear, where they are finally deposited in the then forming germens, the whole probably requiring three or four such reproductions."

"My experiments for resuscitating the grain-worms, I have repeated almost every succeeding year to this day, and always with the same success; but I find that the longer the specimens are kept dry, the grains require to lay in water a greater length of time before the worms will recover; and that at every repetition of an experiment, a smaller number of worms recover their motion; and that after the same specimens (the produce of the grains inoculated in 1807,) had been kept dry *six years and one month*, the worms were all really dead; this period is the longest, which I have as yet ascertained, that these worms can retain their reviviscent quality. That this disease is con-

tagious, is sufficiently proved by the fact that it can at pleasure be inoculated on the soundest seed-corn. The infection, however, is not so generally nor so readily communicated as the diseases occasioned by the fungi of the smut-balls or dust-brand, a few infected ears of which are capable of contaminating and affecting the whole contents of a barn. Grains infested with these embryos cannot vegetate and produce again diseased grains themselves, but can only communicate the infection by coming in contact with the germinating seed-corn in the soil, by the moisture of which the worms are revived, and extricate themselves, which I have so often observed they do when kept sometime in water. Steeping the seed-corn in lime-water, in the same manner as advised for preventing the diseases occasioned by the fungi, is the most efficacious method of preventing the spreading of this disease. I have repeated the experiment by inoculating, very strongly, sound wheat-grains with the worms, and afterwards steeping them in lime-water; and the affection was always prevented. I have, also, steeped some sound wheat-grains in lime-water; and after having kept them in a dry state for some days, I inoculated them strongly with the worms; but on examining the plants, not one instance of the affection occurred. From these facts it is evident, that properly steeping the seed-corn in lime-water before sowing, is a sure preventative of the disease occasioned by the grain-worms."

[H.]

ON ARTIFICIAL MANURE.

Lowell, March 6, 1839.

I.—LETTER FROM S. L. DANA, M. D.

Dear Sir,—The first letter which I write to you, was penned at several sittings—for my head was so very bad, that I was often obliged to throw down my pen and busy myself for hours in darkness. This is my apology for the patchwork I sent you. I kept no copy. In the mean time to make the most of the present letter, I send you the following recipe for a top-dressing, which I think will be next best to "Flanders manure," Give it to the farmers, either through the N. E. F. or at your agricultural meeting to-morrow, or in both ways, or in any way

you please, so that it can be extensively tried, and the result made known. There is an alkali, now extensively imported from England, called "white ash," a carbonate of soda, containing from 36 to 55 per cent of pure alkali. It can be imported, cost and charges, for 4 cents per lb. and may be had of Delano & Whitney, or Grant & Daniels, Boston, for 5 cents per lb. If this is not at hand, take our own pearl ashes, or an equivalent in lye from ashes. Take 100 lbs. peat as sold, or the fine part from the bottom of a peat-stack—at any rate bruise the peat fine, put it into a potash-kettle, and 2 1-2 lbs. white ash, and 130 gallons water; boil for a few hours. Let it settle, dip off the clear for use—add 100 lbs. more of peat, 2 1-2 lbs. white ash, fill up with water as much as you have dipped off, boil again, settle and dip off. Add again 2 1-2 lbs. white ash, boil, settle, and dip off. This may be repeated five times. How much oftener I know not, probably as long as the vegetable part of peat remains. The clear liquor is an alkaline solution of geine. The three first boilings contain geine, alumine, iron, magnesia, and sulphate or phosphate of alkali, potash or soda, according as we have used *white* or *pearlash*. The alumine and iron are quite exhausted by the fourth boiling.

The dark colored brown solution contains about half of an ounce per gallon of vegetable matter. It is to be applied by watering grasslands or grain-crops just after sowing, or in any other way a farmer's quick wit will point out. The "*dregs*" may be mixed with other manure, or spread as a top-dressing; or put in the hill. Experience will teach—I only suggest. I don't pretend to turn a furrow, only to scratch up the ground. Those who have a steam-apparatus, had better put 75 lbs. peat, say 2 bushels, with 1 lb. 14 oz. white ash, and 50 gallons water into a hogshead; let the *steam* into the water and boil up, till the liquor increases to 100 gallons. Then repeat as above for the proportions.

The "Flanders Manure" claims a large part of its active power from its "*urca*." This by exposure is changed into ammonia, and then that acts as an alkali upon geine. In the recipe above, we have ingredients equally as powerful in this action; a plenty of salts, and vegetable matter. The last goes into the plant as an alkaline geate. It is then decomposed by the vegetable acids. The carbon, hydrogen and oxygen of the geine, are disposed of as as the vegetable best knows how; the alkaline base becomes sulphate, phosphate, citrate, malate, tartrate, &c. of alkali, some or all of which are found in plants. Burn the plant, we reproduce carbonate of alkali from the vegetable acid

salts. Carbonates of lime, probably none exist in plants, except in some rare cases, (as in early saxifrage, "*saxifraga vernalis*") as an incrustation on the leaves. Nor do I believe its existence in the soil necessary to the growth of wheat.

But this is neither the time nor place to enlarge on this point.

Respectfully, I am

Very truly your friend and servant,

SAMUEL L. DANA.

Rev. H. COLMAN, Boston.

II.—THE URINE CISTERN

From Radcliffe's Flanders.

The urine cistern is constructed to contain any given quantity. The usual capacity of the vault is for 1000 *tonneaux* (barrels containing about 38 gallons, English) which quantity for the rape-crop, will manure little more than two bonniers, or seven English acres. But the cistern under the stables is nearly of double size; from this the exterior cistern is filled; and between both the farmer can fairly count upon manuring in the best manner, six bonniers or twenty-one English acres; or perhaps two bonniers in addition, of crops which do not require so much manure. The whole of this quantity (exclusive of farm-yard dung, ashes, composts, &c.) is produced by eight horses and thirty-six head of cattle, housed winter and summer in well constructed stables, increased by the adventitious aid of the rape-cake and the *vidanges* from the privies. In a cistern of 1000 *tonneaux*, it is not unusual to dissolve from 2000 to 4000 rape-cakes at 2 lbs. each. Indeed neither industry nor expense is spared for the collection of manure, as upon that depend the produce and fertility of a naturally bad soil. The farmer, who fails to make these exertions, is sure to be left in the back-ground.

The cistern is for the most part formed under the range of stables from each stall of which the urine is conducted to a common grating, through which it descends into the vault. From thence it is taken up by a pump. In the best regulated, there is a partition in the cistern, with a valve to admit the contents of the first space into the second, to be preserved there free from the later acquisition, age adding considerably to its efficacy.

This species of manure is relied on beyond any other, upon all the light soils throughout Flanders ; and even upon the strong lands, originally so rich as to preclude the necessity of manure, is now coming into great esteem, being considered applicable to most crops, and to all the varieties of soil.

III.—HARLEY'S EXPERIENCE.

Harley who kept a dairy of a hundred cows, near Glasgow, says "that the advantage of irrigating grass-lands with cows' urine, almost exceeds belief. Last season, some small fields were cut six times, averaging fifteen inches in length at each cutting ; and the swarth very thick."

IV.—EXPERIMENTS OF C. ALEXANDER.

The following extract transferred from the *Farmer's Magazine* to that spirited and valuable agricultural work, *Young's Letters of Agricola*, is so important and instructive that I subjoin it :

"This intelligent farmer, Charles Alexander, near Peebles, Scotland, had long been impressed with the great importance of the urine of cattle as a manure ; and he set about to discover, by a long and well conducted series of experiments, the best method of collecting and applying it. He began by digging a pit contiguous to the feeding-stall, but distinct altogether from that which was appropriated for the reception of the dung. The dimensions of this pit, according to his own account, were 36 feet square, and 4 feet deep, surrounded on all sides by a wall ; and the solid contents were 192 yards. Having selected the nearest spot where he could find loamy earth, and this he always took from the surface of some field under cultivation, he proceeded to fill it ; and found that, with three men and two horses, he could easily accomplish 28 cubic yards per day : and the whole expense of transporting the earth did not exceed £41. 16s. When the work was complete, he levelled the surface of the heap, in a line with the mouth of the sewer, which conducted the urine from the interior of the building, on purpose that it might be distributed with regularity, and might saturate the whole from top to bottom. The quantity conveyed to it, he estimates at about 800 gallons ; but as this calculation was founded partly on conjecture, for he measured not the liquor, it will be better and more instructive to furnish and proceed on DATA, that are certain and incontrovertible. The urine was supplied by 14 cattle, weighing about 34 stone each, and kept there for five months

on fodder and turnips. The contents of the pit produced 288 loads, allowing 2 cubic yards to be taken out in 3 carts; and he spread 40 of these on each acre, so that this urine in five months, and from fourteen cattle, produced a compost sufficient for the fertilization of seven acres of land. He states further, that he had tried this experiment for ten years, and had indiscriminately used in the same field either the rotted cow-dung, or the saturated earth; and in all the stages of the crop, he had never been able to discover any perceptible difference. But what is still more wonderful, he found that his compost lasted in its effects as many years as his best putrescent manure; and he therefore boldly avers, that a load of each is of equivalent value."

"Conclusions of vast importance are deducible from this statement: and I cannot resist the feeling, of placing them in a strong and advantageous light. They speak a volume of instruction; and if we are willing to learn, they must lead to a very material alteration in the construction of our barns. It appears, then, that in five months, each cow discharges urine which, when absorbed by loam, furnishes manure of the richest quality, and most durable effects, for half an acre of ground. The dung-pit, which contained all the excrementitious matter of the 14 cattle, as well as the litter employed in bedding them, and which was kept separate for the purpose of the experiment, only furnished during the same period 240 loads, and these, at the same rate, could only manure 6 acres. The aggregate value of the urine therefore, when compared with that of the dung, was in the ratio of 7 to 6; so that we are borne out by these premises in this extraordinary inference, that the putrescible liquor which in this province, and under the management of our farmers, is wasted and annihilated as far as regards any useful purpose, is intrinsically worth more than the dung, as an efficacious and permanent dressing: and if we take into consideration, that this latter manure is not treated with any skill and judgment, it will not seem surprising, that the culture of white crops has never been carried here to any extent, since we have despised and neglected the only means of creating them."

[APPENDIX I.]

AGRICULTURAL STATISTICS.

R E T U R N S

OF

BERNARDSTON, FRANKLIN CO.—MARLBOROUGH, MID-
DLESEX CO.—BARRE, WORCESTER CO.

1. *Agricultural Products of Bernardston,*

Farms.	Acres.	Hay.	Corn.	Wheat.	Rye.	Bar- ley.	Oats.	Buck Wht.	Potatoes.	Ruta Baga and Turnips.
1	80	10	25	11				5	15	
2	70	15	50		70				50	12
3	70	8	50		10				300	
4	150	25	75		30		35		275	20
5	20	6	45				25		45	
6	90	15	50				50		50	
7	69	3	20						50	
8	80	8	10		10		20		110	6
9	92	20	75	18		10	25	20	250	
10	85	7	25					30	240	60
11	120	15	40	13	10		20		140	14
12	85	10	50		18		50	5	50	
13	70	10	40	6			60		70	28
14	180	30	150	6	30	6	80		100	
15	180	16	40		70		30	80	100	
16	80	5	65	2	70	3	70		130	32
17	84	20	80	3	60		50	8	120	
18	120	15	100	15	35	7	55	50	100	
19	170	8	50				50	12	150	
20	45	8	75				75	20	50	13
21	150	20	50		200		90	50	150	
22	200	8	90	7	40		12	110	80	
23	140	20	100	5	75		46	21	125	
24	200	12	80		30		80	50	200	
25	140	12	50		50		30	10	70	

Franklin Co. Mass., for the Year 1838.

Wool.	Beef.	Pork.	Butter.	Cheese.	Horses.	Oxen.	Cows.	Sheep.	Young Cattle.
36		450	300	50		2	4	13	8
20		690	170	70	1	2	3		
		600	175		1	2	2	*	
270		850	300		1	2	3	80	3
		900	700			1	7		5
40		400	300		1	2	3	16	6
30		500	350			1	3	9	4
30		690	200		1	2	2	11	2
30		550	300		3	2	4	17	3
75	600	600	250		1		3	28	1
100		935	300	200	1	2	4	29	5
40	550	600	550	400	1	2	6	17	4
20		800	200		1	2	2	14	3
50	600	1780	600	1000	2	2	7	20	7
20		800	300	250	1	2	4	11	3
30		500	250		1	2	3	14	
14		811	234		1	2	2	20	7
100	500	1025	275	150	3	4	3	40	8
		800	400	200	2	2	4	30	7
30		600	150		2	2	2	10	
20		1500	150	200	2	2	3	8	2
20	200	700	500	250	1	2	5	10	
225	600	1582	300	100	1	2	3	100	8
80	500	2200	300	100	1	2	5	20	10
30	1200	1200	325	40	1	2	4	15	5

Farms.	Acres.	Hay.	Corn.	Wheat.	Rye.	Bar- ley.	Oats.	Buck Wh't.	Potatoes.	Ruta Baga and Turnips.
26	75	12	80	10			75		50	30
27	350	25	160	46	160		125	25	150	
28	180	35	180	22	56	10	120	10	100	
29	200	40	200		150		100		150	
31	6	2½	20				10		30	2
32	90	20	50	10	60		20	3	150	5
33	100	12	50	21	12		20		250	
34	170	20	90		65		90		300	10
35	200	30	100	32	80		50		150	30
36	500	50	80	16	60		100		300	
37	200	20	70	10	20		30		200	40
38	100	20	30	12	50		50		100	50
39	126	20	125	25	25		15		350	
40	100	15	75	5	30		100		250	
41	90	12	50				50		300	
42	54	8	25				20		50	10
43	200	20	130		50		50		100	
44	120	10	100		100		100		200	
45	210	65	20		50		40		200	
46	300	25	100		50		100		300	
47	270	45	50		20		88	30	100	
48	100	20	90				60		130	
49	90	10	45				100		60	
50	120	20	20	5		10	35		50	
51	100	15	40		30		100		100	
52	250	50	50	12	90		75	35	500	500
53	96	12	75		40		30		50	

Wool.	Beef.	Pork.	Butter.	Cheese.	Horses.	Oxen.	Cows.	Sheep.	Young Cat- tle.
60		1100	200		2		2	16	3
90	3000	3200	400	160	3	4	6	30	6
200	600	1450	300	200	2	4	5	60	7
80		3000	300	250	2	4	4	11	7
		300	50		2		1		
40		850	250		1	2	3	20	7
70		700	150	50	1	2	2	25	4
100		900	250	200	1	2	4	44	8
350	650	1700	350	350	3	4	6	115	7
300		1500	700	700	1	2	7	100	5
100		775	300	300	2	2	4	50	2
100	1100	350	200		2	2	2	50	3
65		700	250	250	1	2	3	19	4
66		1500	200	160	1	2	4	28	8
		475	150		1	2	2		
19		400	175		1	2	2	10	
75	562	1000	300		1	4	4	25	12
75		1200	300		1	2	3	30	7
	600	700	300	200	2	4	3		8
125	900	1000	200	400	4	4	4	50	
50	450	1075	350		3	6	4	20	8
170	600	900	300	120	1	4	3	70	3
		750	200		3		2		
30	500	500	200	120	2	2	3	12	1
60	1000	350	234		1	2	2	23	6
1200	500	1500	200	100	2	4	3	315	15
150		1600	150		1	2	2	50	1

Wool.	Beef.	Pork.	Butter.	Cheese.	Horses.	Oxen.	Cows.	Sheep.	Young Cat- tle.
1250	2500	2000	500	340	2	6	6	450	11
250	1100	2100	600	100	2	4	7	120	9
800	700	1500	500		1	4	5	300	9

NOTE.

No person, who has looked over the statistical returns of the manufacturing and mechanical industry of the state, compiled the last year by the intelligent and industrious Secretary of the Commonwealth, can have failed to be astonished at their great amount. The result of inquiries into the products of agriculture, would, it is believed, produce equal surprise at their large aggregate. We can scarcely be said to have made a beginning in taxing the labor and skill of our husbandmen, and the capacities of our hard soil. Agriculture, with us, has been too much disdained; and readier modes of acquiring property have been greedily sought after, to the great prejudice of the interests of agricultural labor. It is hoped a better day is dawning upon us, and that the humbler but more substantial comforts of life, in the wholesome rewards of rural industry and independence, will be more justly estimated. The returns, which I have been enabled to obtain, are necessarily very imperfect. Many articles are entirely omitted, and the supplies for the family, furnished by the farm a large part of the year, have not at all been taken into the account. But enough is done, I hope, to convince the Government of the value of such returns, and to induce them to take effectual and early measures to obtain such returns, from every town in the state, with accuracy and fulness. Whatever serves to increase our estimate of the productive capacities of our state, strengthens an attachment to our native soil, abates envy and covetousness in respect to the advantages of other climes and soils, and quiets or extinguishes the restless and infectious spirit of emigration.

H. C.

II.—Returns from Marlboro' for 1838.

Dear Sir,—In compliance with your request we make the following statement :

Total number of acres in the town	-	-	19,480
In water 236 acres, in roads 597 acres	-	-	833
Improved and unimproved land	-	Acres	18,647

The number of farms is 227, which will give a little more than 80 acres to a farm. The farms are principally owned by those who occupy them.

We find, by the returns of the assessors, the following amount of Live Stock :—Horses, 265 ; Oxen, 328 ; Cows, 1211 ; three years old, 91 ; two years old, 73 ; yearlings, 76 ; Sheep, 309 ; Swine, 539.

Butter made and sold ; made, 90,960 ; sold for	\$21,120
Calves fatted, 1037 ; calves raised, 100 ; valued at	7,259
Swine fatted, 539 ; at 300 lbs. each, 161,700 lbs.	
Pork sold, including pigs fatted, and sucking pigs sold	12,170
Winter-apples, raised 3000 barrels ; sold 2000, at 1.50	3,000
Cider, 5000 barrels sold at 1.50	7,500
200 tons of English hay sold at 15 dolls.	3,000

Also hay cut, sufficient to keep all the horses, cattle and sheep in town, allowing two tons per head.

Beef-cattle fatted annually, 300 head, at 600 lbs. per head, making 180,000 lbs., of which about 90,000 lbs. are sold at 6.50 per 100	5,850
Vinegar made and sold annually, 1000 bbls. at 3 dolls.	3,000
Wood sold annually, 1000 cords at 6 dolls. per cord	6,000
Hops sold, 3000 lbs. at 16 $\frac{2}{3}$ per lb.	500
Beans, Peaches, Pears, Cranberries, Quinces, Chesnuts, Poultry, Eggs, &c. &c. say	1,000
	\$70,399

GRAIN RAISED ANNUALLY.

Indian Corn, estimated at	-	-	-	bush.	17,000
Rye	-	-	-	"	3,000
Oats	-	-	-	"	3,000
Barley	-	-	-	"	5,000
Potatoes	-	-	-	"	34,000

Wheat and silk not worthy of enumeration.

The above grain and potatoes are all consumed in the town. The potato-crop falls short this year.

There were not so many swine, nor so much pork fatted this year as usual in town on account of the corn having been cut short the two last years.

Shoes, straw-braid, and barrels are manufactured in the town to a large amount.

Cheese made is consumed in the town, and equals its wants.

The above statement is as correct as our time and means would admit of our making.

(Signed)

CALEB WETHERBEE,
ABRAHAM HOWE,
ELI RICE,
JABEZ S. WETHERBEE,
STEPHEN MORSE.

MARLBORO', Dec. 29, 1838.

REV. HENRY COLMAN.

III.—*Returns of the Agricultural Products of the town of Barre, in Worcester Co., for 1838.*

Number of acres—total	-	-	-	23,579
“ Cows kept	-	-	-	1,635
“ Oxen	-	-	-	432
“ Young cattle	-	-	-	1,080
“ Beef-cattle fatted	-	-	-	286
Indian Corn	bushels	-	-	13,316
Rye	do.	-	-	3,982
Oats	do.	-	-	15,653
Barley	do.	-	-	1,803
Hay	tons	-	-	6,453
Pork, fatted	lbs.	-	-	193,196
New milk Cheese	do.	-	-	305,731
Skim-milk Cheese	do.	-	-	29,060
Butter	do.	-	-	45,143
Potatoes	bushels	-	-	42,465

(Signed)

DAVID LEE.

BARRE, Nov. 6, 1838.

[J.]

GRAMINÆ—GRASSES OF BERKSHIRE COUNTY.

(From Professor Dewey.)

CINNA. 1. 2.

arundinacea. Indian reed. July. Low grounds; woods.

ANTHOXANTHUM. 3. 1.

odoratum. Sweet vernal grass. June. Meadows; upland.

ORYZOPSIS. 3. 2.

asperifolia. Mountain-rice. April. Dry woods on hills.*melanocarpa*. Black-fruited do. June. Dry hills.

DIGITARIA. 3. 2.

sanguinalis. Finger-grass. Aug. Roads and fields; common.

LEERSIA. 3. 2.

virginica. Cut-grass. Aug. Wet; marshy.*oryzoides*. do. do. do.

MUHLENBERGIA. 3. 2.

erecta. Dropseed-grass. July. Moist, low woods.

TRICHODIUM. 3. 2.

laxiflora. Thingrass. do. Dry fields.*scabrum*. do. do. Dry, open woods.

AGROSTIS. 3. 2.

vulgaris. C. Redtop. do. Fields; light soil.*alba*. White or yellow top. June. do.*lateriflora*. Aug. Wet woods, swamps, &c.*diffusa*. do. Fields.*setosa*. do. do.*sericea*. do. do.

ARUNDO. 3. 2.

canadensis. Reed-grass. July. Wet; marshy.*phragmites*. Large do. Aug. Negro pond in Stoc.

PHLEUM. 3. 2.

pratense. C. Timothy grass. June. Fields.

ALOPECURUS. 3. 2.

geniculatus. True foxtail grass. July. Wet, muddy bottoms.

PHALARIS. 3. 2.

americana. Wild Canary grass. July. Marshy.var. *picta*, C. Ribbon-grass. July. Gardens; yards.

DACTYLIS. 3. 2.

glomerata. Orchard-grass. June. About yards.

POA. 3. 2.

annua. Rooting grass. May. Gardens and fields.

compressa. Blue grass. July. Dry soil

pratensis. Meadow-grass. May. Fields; meadows.

dentata. Wet do. July. Muddy bottoms.

aquatica.

var. *americana.* Great do. Aug. Wet meadows.

trivialis. False redtop. July. Moist meadows.

nemoralis. do. June. do.

nervata. Large spear-grass. June. do.

elongata. July. Borders of wet meadows.

canadensis. do. do.

quinquefolia. Huge redtop. do. Wet places.

AIRA. 3. 2.

flexuosa. Hair-grass. June. Dry, rocky hills.

truncata. do. do. Dry woods.

FESTUCA. 3. 2.

elatio. Fescue-grass. do. Wet meadows.

pratensis. do. do. Dry banks of meadows.

tenella. July. Sandy soil.

fluitans. Sarge do. do. Marshes and ditches.

DANTHONIA. 3. 2.

spicata. Wild oats. do. Sandy, dry hills.

TRisetum. 3. 2.

purpurescens. False hair-grass. June. High mead.

BROMUS. 3. 2.

secalinus. Chess. June. Cultivated fields.

purgans. False chess. May. Alluvial banks.

ciliatus. do. Aug. do. on streams.

pubescens. do. do.

ARRHENATHERUM. 3. 2.

pennsylvanicum. False oats. June. Light soil.

LOLIUM. 3. 2.

perenne. Darnel-grass. July. Roads and fields.

TRITICUM. 3. 2.

æstivum. C. Summer-wheat. June.) Rarely growing wild.

hybernum. C. Winter wheat. do. }

repens. Wheat or quack-grass. do. Gardens; fields.

AVENA. 3. 2.

<i>sativa</i> . C. Oats.	June.	Rarely growing wild.
<i>sterilis</i> . C. Animated oats.	July.	Gardens.

SECALE. 3. 2.

<i>cereali</i> . Rye.	June.	Rarely growing wild.
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ELYMUS. 3. 2.

<i>hystrix</i> . Lime. grass.	July.	} Alluvial banks; rivers,
<i>villosus</i> . Wild rye.	do	
<i>canadensis</i> . do. Lime-grass.	July.	do.
<i>virginicus</i> . do	June	do. and dry hills.
<i>glaucofolius</i> . Great wild rye.	July.	do.

PANICUM. 3. 2.

<i>crus-galli</i> . Cockfoot-grass.	July.	Cultivated fields,
<i>latifolium</i> . Panic-grass.	June.	Open woods.
<i>capillare</i> . Hairy do.	Aug.	Cultivated fields.
<i>depauperatum</i> . Short do.	July.	Moist pastures.
<i>nitidum</i> . Slender do.	June.	Fields and pastures.
<i>glaucum</i> . Bottle-grass.	July.	Cultivated fields.
<i>italicum</i> . C. large do.	do.	Gardens.

ANDROPOGON. 3. 2.

<i>purpurescens</i> . Broom-grass.	Aug.	Light sandy soil.
<i>furcatum</i> . Forked spike-grass.	do.	Alluvial.
<i>nutans</i> . Beard-grass.	do.	do.

HORDEUM. 3. 2.

<i>vulgare</i> . C. Barley.	June.	
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SORGHUM. 3. 2.

<i>saccharatum</i> . C. Broom-corn.	Aug.	Gardens and fields.
<i>vulgare</i> . C. Coffee-corn.	do.	do.

ZEA. 20. 3.

<i>mays</i> . C. Indian corn.	July.	
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JUNCI—(Rush-grasses.)

JUNCUS. 6. 1.

<i>effusus</i> . Bull-rush.	June.	Wet places; low streams.
<i>setaceus</i> . Slender do.	do.	Low meadows.
<i>tenuis</i> . Common bog-rush.	July.	Low grounds.
<i>nodosus</i> . Tall bog-rush.	do.	Low meadows.
<i>bufonius</i> . Frog-rush.	do.	Low, sandy wet places.
<i>polycephalus</i> . Strong bog-rush.	Aug.	Wet pastures.
<i>pilosus</i> . Hairy-rush.	April.	Border of moist woods.
<i>campestris</i> . Large rush.	May.	Moist pastures.

ACORUS. 6. 1.

calamus. Sweet flag. May. Beside lowland brooks.

TRADESCANTIA. 6. 1.

virginica. Spider-wort. June. Gardens.

HELONIAS. 6. 3.

dioica. False unicorn-wort. May. Moist woods; Stockbridge.

VERATRUM. 6. 3.

viride. Itch-weed. June. Alluvial soil; also on high brooks.

ALISMA. 6. 3.

plantago. Water-plantain. July. Low, wet places.

SAGITTARIA. 20. 13.

sagittifolia. Arrow-head. June. Low brooks.

latifolia. do. do. do.

heterophylla. Diverse-leaved do. Aug. Pond on Taconic Mt.

graminea. Grassy do. do. do.

SCHEUZERIA. 6. 3.

palustris. Flowering rush. June. do.

ERIOCAULON. 20. 13.

gnaphaloides. Pipe-wort. July. do.

POTAMOGETON. 4. 4.

natans. Pond-weed. June. Aquatic; rivers, ponds.

fluitans. do. do. do. do.

gramineum. Grassy do. July. do. low, muddy bottoms; ponds.

perfoliatum. do. Ponds; Pittsfield,

REPORTS of the Valuation Committee in 1831—BERKSHIRE COUNTY.

TOWNS.	LAND—ACRES.											Total Number of Acres.
	Tillage.	English and Upland Mowing.	Fresh Meadow.	Salt Marsh.	Pasturage.	Wood.	Unimproved.	Unimprovable.	Owned by the Town or other Proprietary.	In Roads.	Covered with Water.	
Adams, -	998½	2900½	...	...	4754	4137	4718	5067½	2000	319½	178	25,072½
Alford, -	549	427	105	...	269½	44	38	1470	...	116	45	5153½
Becket, -	281	2630	107	...	3557½	...	7706½	13684	...	...	...	23,650½
Cheshire, -	621½	2246	361	...	3619½	1285	2275½	5289	50	321	153	16,211½
Clarksburg, -	95	214	22	...	380	...	3276	936	4091	70	21	9108
Dalton, -	488	1494	11	...	3139	6144	653	281	...	...	...	12,210
Egremont, -	2359½	224½	687	...	2103	1730	1876	814	...	252	150	10,251½
Florida, -	116	610	...	...	924	...	6935	3960	...	...	...	12,545
Great Barrington, -	2957½	1691	885½	...	5316	504½	3824	6716½	527	490	510	23,621½
Hancock, -	501½	2101	103	...	4470	2205	...	5636	5001	179	154	20,250½
Hinsdale, -	291½	1590	252	...	3134	3245	2847	761	456	327	12	12,915½
Lanesborough, -	769	2511	354	...	5342	1844	2177	3234	269	250	455	17,205
Lee, -	1134½	1883	162	...	1923	2273	3787½	804	...	269	331	14,566½
Lenox, -	950½	2096	...	...	3971½	2255½	715	1322½	...	...	...	11,341½
Mount Washington, -	453	298	...	...	846	...	216	4108	...	108	75	6104
New Ashford, -	128½	516½	34	...	861	499	733	4288	...	65	...	7125
New Marlborough, -	969	1880	533	...	5639	3200	2841	7733	2612	310	180	25,897
Otis, -	134	1764	179	...	3651	...	8843	4489	...	317	2673	22,050

TABLE—Continued.

TOWNS.	LAND—ACRES.											
	Village.	English and Upland Mowing.	Fresh Meadow.	Salt Marsh.	Pasturage.	Wood.	Unimproved.	Unimprovable.	Owned by the Town or other Proprietary.	In Roads.	Covered with Water.	Total Number of Acres.
Peru,	222	3603½	19	.....	4152	3730	2660	1064	.....	.....	.....	14,850½
Pittsfield,	1565	2771	454	.....	8493	3347	3667	2939	.....	.....	.....	23,236
Richmond,	765½	1545	58	.....	4991	2395½	826	81	.....	360	90	11,112
Sandisfield,	454	3450	7	.....	6902	3772	6647	7064	.....	805	396	29,497
Unincorporated land adjoining Sandisfield,	.....	.....	.....	.....	130	.....	155	182	.....	.....	.....	467
Savoy,	173	1310	.....	.....	1286	.....	16,384	5078	.....	239	35	24,505
Sheffield,	4294	2510	2677	.....	6145	5331	4953	2190	.....	.....	.....	28,100
Stockbridge,	1635½	1715½	2621	.....	4636½	2680½	773	1584½	.....	284½	500½	14,073½
Tyringham,	480½	1938	.....	.....	2775	.....	15,741	3671	.....	560	475	25,643½
Washington,	366	1683	.....	.....	2821	1533	8548	6410	.....	.....	.....	21,361
West Stockbridge,	1087	831	435	.....	4280	1417	566	2127	4	265	255	11,267
Williamstown,	1518	3904	.....	.....	8075	4401	1707	2438	.....	224	121	22,388
Unincorporated land adjoining Williamstown,	62½	202			725	425	346	434				2194½
Windsor,	407	3056	22		3392	2579	8129	2154		492	449	20,680½

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ERRATA.

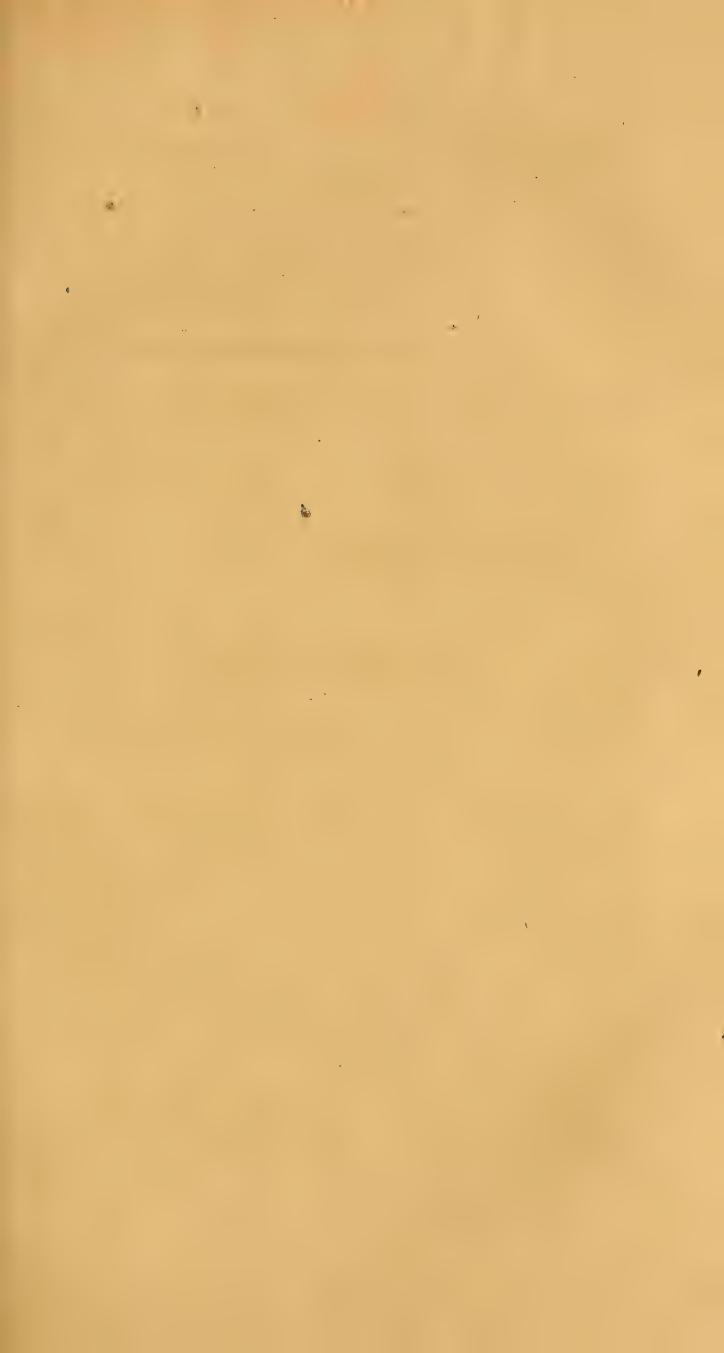
Page 20—line 13—for “ farm,” read “ farmer.”

“ 53—line 22—for “ butter,” read “ cheese.”

“ 84—line 34—for “ that native perception,” read “ those native perceptions.”

“ 94—line 10—for “ Sheffield,” read “ Great Barrington.”

“ 144—line 27—after “ Spurr,” read “ of Sheffield.”





THIRD REPORT

OF THE

AGRICULTURE OF MASSACHUSETTS.

THIRD REPORT

OF THE

AGRICULTURE OF MASSACHUSETTS,

ON

WHEAT AND SILK.

BY HENRY COLMAN,

COMMISSIONER FOR THE AGRICULTURAL SURVEY OF THE STATE.

Boston:

DUTTON AND WENTWORTH, PRINTERS TO THE STATE.

1840.

Boston, 3d March, 1840.

To the Hon. DANIEL P. KING,

President of the Senate of Massachusetts :

SIR,

The Commissioner for the Agricultural Survey of the State, has the honor to submit to the Senate a Report on the Cultivation of Wheat in Massachusetts, prepared in compliance with the order of the Legislature of March 20, 1839, which is annexed.

The duty would have been sooner executed, but the Returns were not accessible to the Commissioner, until a considerable time after the passage of the order ; and the season afterwards being that of active duty abroad, he was under the necessity of postponing the report. The number of individual returns to be looked over, amounting to nearly four thousand, have necessarily occupied a long time. The subject being of great importance, he has devoted to it much labor and inquiry.

Though not within the terms of the order, yet the Commissioner asks leave of the Senate to subjoin his Report on the Culture of Silk in the State. The information he proposes to give on this subject is of much consequence. Knowing the importance of this subject, and the impatience and curiosity of the public mind in regard to it, the Commissioner travelled more than sixteen hundred miles, the last autumn, that he might

make inquiries, in person, in places where Silk had been produced, and obtain information, which he could present in an authentic form. He desires, therefore, to connect it with his Report on the Culture of Wheat, instead of delaying it for his more general Reports.

He respectfully, through you, sir, submits the subject to the Senate; and has the honor to subscribe himself,

With the highest respect,

Your obedient servant,

HENRY COLMAN.

Commonwealth of Massachusetts.

IN SENATE, March 20, 1839.

ORDERED, That the Governor be requested to obtain from the Agricultural Commissioner, a full report of the cultivation of Wheat, in this Commonwealth, the last year ; in reference to all those particulars specified in the act of 1838, offering a bounty upon the product of Wheat ; which have a practical bearing on its culture ; collating such facts from the returns, as will secure, as far as practicable, the great object of granting the bounty, by gathering the experience of the past year, as far as may be, to aid the future culture of Wheat in this Commonwealth ; with such other information respecting the cultivation of Wheat, as may be deemed important ; and lay the same before the Senate, when obtained ; and that for this purpose, the Agricultural Commissioner be allowed the use of the Wheat Returns, in the office of the Secretary of State, as far as they may be needed by him.

Sent down for concurrence.

CHA'S CALHOUN, *Clerk.*

HOUSE OF REPRESENTATIVES, March 20, 1839.

Concurred.

L. S. CUSHING, *Clerk.*

A true copy. Attest.

JOHN P. BIGELOW,
Secretary of the Commonwealth.

AGRICULTURAL REPORT.

WHEAT RETURNS OF COUNTIES.

1838-9.

BERKSHIRE COUNTY.

ADAMS.—No. of Claimants, 10. Acres not reported. Product, 310½ bush.
Average yield of 18½ acres reported, 11¼ bush. per acre.
Largest crop reported, 15 bush. per acre.

REMARKS. One crop highly manured, 14½ bs. per acre, injured by insects.

ALFORD.—Claimants, 7. Acres sown, 17¾. Product, 215 bush.
Average pr acre, 12½ bush.
Crops 20 bush. ; 18 bush. ; two 16 bush. each per acre.

REMARKS. No manure for largest crop. In several cases 1½ bushel of plaster applied per acre, without marked results. Two cases of grain insect.

BECKET.—Claimants, 20. Acres sown, 33¼. Product, 397 bush.
Average, 12 bush. per acre.
Crops, 20 bush. ; 18 bush. per acre.

REMARKS. Seed, Tea wheat. Amount of seed generally, 1¼ bs. per acre. In two cases, two bushels were sown to the acre, but without marked advantage. One crop, 18 bs. received 20 bush. leached ashes; one, five loads leached ashes. The application of lime, not exceeding four bushels to the acre, without perceptible effect. Soil "loamy or sandy loam." Twelve crops suffered from drought, and three from wire worm.

CHESHIRE.—Claimants, 21. Acres sown, 41. Product, 666¾ bush.
Average per acre, 16¼ bs.
Crops, 22 bs. 19 bs. ; four, 16 bush. per acre.

REMARKS. Best crops, on "slate soil," and "black muck." Six crops injured by grain insect. No lime excepting on the seed.

CLARKSBURG.—Claimant, 1. Acres sown, 3. Product, 40 bush.

Average per acre, $13\frac{1}{3}$ bush.

Largest yield, 20 bush, per acre.

REMARKS. Seed, the Leghorn. Injury from hail.

DALTON.—Claimants, 16. Acres sown, $23\frac{3}{4}$. Product, 382 bush.

Average per acre, $12\frac{1}{4}$ bush.

Crops, 23 bush. per acre; 22 bush.; two 19 bush.

REMARKS. Crop of 22 bush. with 15 bush. ashes per acre. Of 19 bush. with 1 cask of lime and 6 bush. ashes, and six loads long manure. Three cases of lime, two bush. per acre; without advantage. Seed, tea-wheat. Two crops blasted; four cases of grain worm.

EGREMONT.—Claimants, 27. Acres sown $52\frac{1}{4}$. Product, $788\frac{1}{2}$ bush.

Average, 15 3-10 bush. per acre.

Crops, 24 bush.; 20 bush.; $19\frac{1}{2}$ bush.; two, 18 bush.

REMARKS. Largest crop, with ten loads stable manure, on gravelly loam. Plaster customarily applied; $1\frac{1}{2}$ bush. per acre. Three cases grain insect; four of cut worm; one smut-wheat rolled in lime, but not soaked in brine; one case rust, one mildew. The soil of Egremont peculiarly favorable for grain. Five loads of coarse straw applied to an acre; the yield, 10 bushels.

FLORIDA.—Claimants, 2. Acres sown, $4\frac{1}{4}$. Product, 73 bush.

Average per acre, 17 1-6 bush.

REMARKS. Crop of 20 bushels per acre, with 50 bushels leached ashes, and 2 bushels lime per acre.

GT. BARRINGTON.—Claimants, 54. Acres, 122 11-24 bs. Product, 1764 bs.

Average, $14\frac{1}{2}$ bush. per acre.

Crops $26\frac{1}{2}$ bs.; $25\frac{1}{2}$ bs.; three, 21 bs.; 20 bs. pr. acre.

REMARKS. Crop of 20 bushels per acre with 4 loads of light rotten manure spread on the grain. Twenty-eight crops with plaster; $1\frac{1}{2}$ bushels per acre; twenty-nine cases of grain insect.; one of worm at the root; one of grasshoppers.

HANCOCK.—Claimants, 13. Acres sown, $17\frac{3}{4}$. Product, $285\frac{1}{2}$ bush.

Average per acre, 16 bush.

Crops, 24 bush.; 22; 21; 20 bush. per acre.

REMARKS. Crop of 24 bushels, had 8 bushels of ashes per acre; 21 bushels, 15 bushels ashes, per acre; of 19 bushels with 3 bushels gypsum and 2 of ashes. With 8 bushels ashes, crop 15 bushels per acre.

HINSDALE.—Claimants, 28. Acres sown, $44\frac{1}{4}$. Product, 683 $\frac{3}{4}$ bushels.

Average, $15\frac{1}{2}$ bush. per acre.

Crops, 28 bush.; 25 bs.; 24 bs.; two, 22; 21; two, 20; 19; 18 bush. per acre.

REMARKS. Crop of 28 bush. with four bushels of lime per acre. Of 21 bushels with 25 loads of manure in 1837. One case of ashes, the crop 14 2-5 bushels per acre. One case of smut; the seed limed, but not soaked in brine.

LANESBORO'.—Claimants, 45. Acres sown, 85½. Product, 1183½ bs.
Average crop, 13 bs. per acre.

REMARKS. With 100 bushels lime per acre, the yield 11½ bushels per acre. Saltpetre and lime applied, but quantities not given. Yield 15 bushels. In one case, land manured the year of the wheat. Plaster in 16 cases, 1 to 1½ bushels per acre. No definite results.

LEE.—Claimants, 29. Acres sown, 59½. Product 806½ bushels.
Average crop, 13½ bs. per acre.
Crops, 26½ bs.; 24 bs.; two of 18½ bs.

REMARKS. With 20 bushels lime to 1¼ acre, crop 11½ bushels; suffered from drought. Three applications of plaster, but no perceptible result. With four bushels of ashes to the acre, the crop 12¾ bushels; suffered from drought. On the same farm, one acre of spring wheat, gave 18 bushels; 2 of winter wheat, 5 bushels each. Three cases of grain insect; one of rust from late sowing; one of smut; the seed soaked in brine, and rolled in plaster.

LENOX.—Claimants, 50. Acres sown, 108½. Product, 1413 bushels.
Average crop, 13½ bs. per acre.
Crops, 26 bs.; three of 20 bs. per acre; two of 18 bs.

REMARKS. Crop of 26 bushels, with six loads yard manure, and ten bushels of lime and ashes, amount not stated; sown on 30th April. Soil, a dark loam. Prevailing rocks of this locality, mica slate.—A second piece on the same farm, with six loads of barn manure, and ten bushels of lime, and two bushels of plaster, produced 12½ bushels to the acre; sown on 22d May.

This farmer, Eldad Post, harrows his wheat repeatedly, after sowing, even after it has germinated; considers the exposure of the seed and soil to light and air, highly beneficial. His cultivation usually successful; two years since, his spring wheat was more than 34 bushels per acre.—Results in these returns quite various. One acre, with five bushels lime, and two bushels of gypsum, produced 11¾ bushels to the acre. One with 60 bushels lime, 13 bushels wheat. Twelve cases of grain insect; four worm at the root. One of smut; seed rolled in lime, but not soaked in brine.

NEW ASHFORD.—Claimants, 12. Acres sown, 22. Product, 366 bs.
Average crop, 16 7-11 bs. per acre.
Crops, 20 bs.; 16 bs.

REMARKS. Excepting one case, manured previous year. Six crops "shrunk."

N. MARLBORO'.—Claimants, 26. Acres sown, 46. Product, 669½ bs.

Average crop, 14½ bs. per acre.

Crops, 29 bs. ; 20 ; 19½ ; two, 18 bs.

REMARKS. Crop of 29 bushels, winter wheat, on new land. Soil, "sili-
ceous." Crop of 20 bushels, winter wheat ; part of the same piece in spring
wheat. The spring wheat failed to come up ; no manure in either case.
Soil, "a dark loam." Plaster applied ; in one case, 5 bushels of lime, and
1 bushel of plaster ; in one, 12 bushes of ashes ; without apparent effects.

OTIS.—Claimants, 4. Acres sown, 7½. Product, 117½ bushels.

Average, 16½ bs. per acre.

REMARKS. Crop, 23 bushels ; chip manure and lime ; quantity not stated.
Chip manure is the refuse of the door yard, impregnated with soap-suds, and
the usual varieties. To the crop, 11½ bushels per acre, lime and ashes ap-
plied ; quantities not given.

PERU.—Claimants, 11. Acres sown, 14½. Product, 243 bushels.

Average crop, 16 1-5 bs. per acre.

Crops, 24 bs. ; 22 bs. ; 17 bs.

REMARKS. Largest crop, with 6 loads sheep manure, and 15 bushels ashes
to the acre. With 15 loads of stable manure, and 20 bushels of ashes per
acre, product, 10 bushels. Seed, in this case, three bushels. Two cases
20 loads of long manure, and 4½ bushels of lime, and 15 cords of yard ma-
nure, and 2 loads of refuse lime ; crop 15 bushels each per acre. Best crop,
red bearded. Others, the tea wheat. No accident. Peru is among the most
elevated lands in the State.

PITTSFIELD.—Claimants, 57. Acres sown, 142½. Product, 1934 bs.

Average crop, 13½ bs. per acre.

Crops, 4 of 20 bs. per acre ; 4 of 19 bs. per acre ; 7 of 18
bs. per acre ; 5 of 17 bs. per acre.

REMARKS. Crop of 17 bushels, received 5 bushels ashes per acre. An-
other piece with 6 bushels of ashes per acre, gave 14 bushels. Tea-wheat,
not injured by grain worm ; bearded wheat suffered on same farm. With
12 bushels of ashes, crop 6 bushels. With 20 bushels per acre of ashes, crop
19 bushels per acre. With 10 bushels of ashes per acre, crop 15 bushels.
With 15 bushels of ashes, crop 10 bushels. With 4 bushels ashes per acre,
and 10 loads manure, crop 12 bushels. With 7½ bushels ashes per acre,
without manure, crop 13¾ bushels. In 9 cases, plaster without manure, the
crops from 12 to 14 bushels. Several cases of grain insect. The appli-
cation of the marls in this vicinity has yet been followed by no marked bene-
fits to the wheat crop. Much is still hoped from them.

RICHMOND.—Claimants, 23. Acres sown, 80. Product, 1176½ bs.

Average crop, 14 7-10 bs. per acre.

Crops, 22 bs. ; 3 of 21 bs. ; 20 bs. ; 19 bs.

REMARKS. Largest crop with lime, ashes and plaster, quantities not stated. With 20 bushels of ashes, crop 14 bushels per acre; much injured by grain insect. Crop of 21 bushels per acre, was with horse and sheep manure, and 100 lbs. plaster. Fifteen crops with gypsum, but no definite result. Winter wheat injured by frost. Ten cases of grain insect. Three rust. Two drought.

SANDISFIELD.—Claimants, 7. Acres sown, $11\frac{1}{2}$. Product, $157\frac{1}{2}$ bush.

Average per acre, $13\frac{1}{2}$ bush.

Crops, $22\frac{3}{4}$; 20; $19\frac{1}{4}$, bush. per acre.

REMARKS. Crops of $22\frac{3}{4}$ bush. received 27 bush. ashes per acre, on dry loam. Crop of 20 bush. on moist loam, with one bushel gypsum. Crop of $19\frac{1}{4}$ bush. to the acre, with 12 bush. ashes and 22 bush. of lime on 146 rods of land. On same soil, gravelly loam, six loads of leached ashes on 212 rods, produced 15 bush. per acre; 2 loads of leached ashes on 140 rods, produced $6\frac{3}{4}$ bush. per acre. The town of Sandisfield is elevated. Leached ashes freely used in every case but two. No injury or accident.

SAVOY.—Claimants 8. Acres sown, $11\frac{1}{2}$. Product, 167 bush.

Average, 15 bush. per acre.

Crops, 22; 20; 19; 17; bush. per acre.

REMARKS. Seed soaked in beef brine twenty-four hours, crop slightly smutted. Of seed without preparation, one fourth smutted. Stable manure, nine loads, and fifteen loads, per acre.

SHEFFIELD.—Claimants, 73. Acres sown, $249\frac{1}{2}$. Product, 3902 bs.

Average, $11\frac{1}{2}$ bush. per acre.

Crops, 31; 25; $24\frac{1}{2}$; five of 24; one of $22\frac{1}{2}$; one of $20\frac{1}{2}$; ten of 20 bush. per acre.

REMARKS. Largest crop, mostly winter wheat, with 15 loads of manure; "injured by the spring." Crop of 25 bs., with 10 loads of manure. Crop of $20\frac{1}{2}$ bs. with 20 bs. of lime and one of plaster, per acre. In one case grain was winter-killed; thirty-five cases of grain insect.

STOCKBRIDGE.—Claimants, 29. Acres sown, $67\frac{1}{2}$. Product, $95\frac{1}{4}$ bs.

Average, $14\frac{1}{4}$ bush. per acre.

Crops, 22 bs.; 20 bs.; two 18 bs., per acre.

REMARKS. In one case winter wheat produced 12 bs., spr. wheat $11\frac{3}{4}$ bs.

In " " " " 16 bs., " " 12 bs.

In " " " " 10 bs., " " 22 bs.

In " " " " 14 bs., " " $16\frac{1}{2}$ bs.

One case bearded wheat injured by grain insect; tea wheat not. Wheat seeded, 55 qts. per acre, "suffered from thick sowing." A farmer states he can raise more bushels of wheat than of rye on same land. His soil is clay and sandy loam. He uses a small quantity of barn manure; and a top-dressing of one bushel of plaster and ashes, quantity not stated.

 An entry made here, and premium paid, on 17½ bushels of India Wheat, i. e. Tartarian Buck Wheat.

W. STOCKBRIDGE.—Claimants, 27. Acres, 90 13-16. Prod. 1246½ bs. Average, 13 11-15 bs. per acre.

Crops, 28 bs. ; 24 bs. ; 22 bs. ; 20 bs. ; 19 bs.

REMARKS. Crop of 28 bs. on loam, and ½ a bushel lime and plaster.—Other large crops without manure. In five cases, 1½ bushels of plaster applied per acre, without marked difference. Nine cases of grain insect. One of smut ; wheat simply rolled in plaster.

TYRINGHAM.—Claimants, 13. Acres sown, 14½. Product, 267¼ bush. Average, 19 bush. per acre.

Crops, 20 bs. ; 17 bs. ; two 16½ bs. per acre.

REMARKS. Ten bushels lime applied, crop 16½ bushels ; thirty bushels lime applied, crop 13 bushels ; crop of 20 bushels, manured with 20 loads chip manure. One case of grain insect.

WASHINGTON.—Claimants, 14. Acres sown, 23¼. Product, 339 bush. Average, 14½ bush. per acre.

Crops, 21½ bs. ; 20 bs. ; 19 bs. ; 18 bs., per acre.

REMARKS. Crop 21½ bs., land the previous year had 20 loads of manure ; 20 bs., land the previous fall had 15 loads manure, 5 bs. ashes. Land with 20 loads manure, 3 bs. lime, 5 bs. ashes, gave 14 bs. wheat. Soil sandy.

WILLIAMSTOWN.—Claimants, 56. Acres, 140¼. Produce 1731 bush. Average, 12 21-70 bush. per acre.

Crops, 23¾ bs. ; three of 20 bs. ; two of 19 bs. ; five of 17 bs.

REMARKS. Crops sowed from 12th of May to 1st of June, suffered from late sowing. Largest crop grown on a "slaty gravel." Four cases of wire worms ; two in clay soil ; one in green sward. Twelve cases of plaster, but no marked effect. One case of lime applied on the wheat when in flower, for destruction of grain insect ; the crop injured by the insect, but no particulars given of the lime, quantity, or manner of application. Late sowing strongly disapproved by the reports of this town.

WINDSOR.—Claimants, 17. Acres sown, 18¾. Product, 374¼ bush. Average, 18½ bush. per acre.

Crops, 28½ bs. ; 26¼ bs. ; 24 bs. ; 22 bs. ; 21¾ bs. ; 21 bs. per acre.

REMARKS. Crop 28 bush. on a dark red loam and light dressing of sheep manure. 26¼ bush. with sheep manure and 15 bush. ashes. 24 bush. with manure from cattle. The crops of 22 bush., 21¾ bush., 20¼ bush., two of 18¾ bush. 17¼ bush. with 12 or 15 bush. ashes. In Windsor a crop of Indian corn of 116 bs. per acre, received a premium from the Berkshire Agricultural Society. The success attributed to abundant application of leached ashes.

FRANKLIN COUNTY.

ASHFIELD.—Claimants, 59. Acres sown, 80½. Product, 1259¼ bush.
Average per acre, 15 47-80 bush.
Crops, 21 bs. two of 20 bs. one of 19 bs. three of 18 bush.
per acre.

REMARKS. Largest crop without manure. Lime three bs. per acre, and ashes applied, but no results given; three cases of grain insect; four cases of injury by drought. The soil clayey loam.

BERNARDSTON.—Claimants, 9. Acres sown, 12¾. Product, 244 bush.
Average per acre, 19 bush.
Crops, 26 bs. 25½ bs. 24¼ bs. one of 22 bush. per acre.

REMARKS. Largest crops without manure. Two bs. lime and plaster applied; crop, 10 bs. Three cases of grain worm. Where winter and spring wheat on the same farm; the winter wheat gave 19 bs. the spring 18 bs per acre.

BUCKLAND.—Claimants, 11. Acres sown, 16 41-60. Product, 256 bush.
Average per acre, 15 3-16 bushels.
Largest crop, 21 bush. on an acre.

REMARKS. This crop received 15 loads of barn yard manure. 5 cases of grain insect.

CHARLEMONT.—Claimants, 17. Acres sown, 26 25-48. Product, 414½ bush.
Average per acre, 15½ bush.
Largest crops, 22½ bs. 22 bs. 21½ bs. three of 16½ bush.
per acre.

REMARKS. The largest crop, 10 loads of stable manure, on a "red loam." 500 lbs. plaster, and 1 hhd. of lime applied to 2 acres; crop, 7½ bs. per acre. This was winter wheat; and suffered much from grain insect. Land highly manured the previous year, and 20 bs. ashes upon 1¼ acre, crop, 15 bs. per acre. Nine cases of grain insect.

COLERAINE.—Claimants, 29. Acres sown, 46. Product, 709¾ bush.
Average per acre, 15 19-46 bush.
Largest crops, 21 bs. seven of 20 bs. one of 19 bs. three of 18 bs. per acre.

REMARKS. Largest crop without manure; crop of 19 bs. with 30 loads compost, and 30 bs. of ashes, on 1¾ acres; soil, dry loam. Four cases of grain worm. Several crops suffered from hail storm.

CONWAY.—Claimants, 32. Acres sown, 49. Product, 666 bush.
Average per acre, 13 3-5 bush.
Crops, 24 bs. 23 bs. two of 20 bs. one of 19 bs. four of 18 bs.
per acre.

REMARKS. Largest crop, with 8 loads barn manure, and 9 bush. leached ashes. Crop of 20 bush. no manure. Two cases of smut; the seed not steeped. Three cases of grain insect. One case of wire worm.

DEERFIELD.—Claimants, 59. Acres sown, 149 73-480. Product, 2311 bush.
Average per acre, 15½ bush.
Largest crops, 28 bs. 26 bs. 25 bs. two of 23½ bush. per
acre.

REMARKS. Crop of 28 bs. on rich alluvial land, sown in October. Crop of 18 bs. with thirteen loads of muck. One of 23 received 20 loads of manure on rich alluvial land and after clover. One of 26 bs. after corn crop. Five cases of grain insect. One of smut, seed not prepared.

ERVING.—Claimants, 3. Acres sown, 4½. Product, 64½ bush.
Average per acre, 13 bush.
Largest crops, 18 bs. 15 bs. 11 bush. per acre.

REMARKS. Crop of 18 bs. had 18 loads of manure. One farmer reports uniform success in growing wheat, for three years. His wheat follows corn well manured. One case of smut; seed washed in clear water.

GILL.—Claimants, 12. Acres sown, 20½. Product, 293 bush.
Average per acre, 14 1-20 bush.
Largest crops, 23 bs. 20½ bs. 18 9-32 bs. one of 17 19-32 bush per
acre.

REMARKS. Crop of 23 bs. with 26 loads of manure. One crop sowed late in October, winter killed, crop 6 bs. upon half an acre. Five cases of grain insect.

GREENFIELD.—Claimants, 8. Acres sown, 16¾. Product, 228½ bush.
Average per acre, 13½ bush.
Largest crops, 16 bs. two of 15 bs. one of 13 bs. two of
12 bush. per acre.

REMARKS. Largest crops on new land; with 5 bs. plaster and 20 bs. of ashes upon 2 acres; crop, 12 bs. per acre. Five cases grain insect

HAWLEY.—Claimants, 17. Acres sown, 25¼. Product, 301 bush.
Average per acre, 13½ bush.
Largest crops, 27 bs. 20 bs. 18 bs. two of 17 bush. per acre.

REMARKS. Largest crop 27 bs., with 8 loads manure, and 25 bs. of lime per acre. Crop of 20 bs. with 18 loads of manure. Two farmers in this town have produced a prolific and superior wheat, by a selection of promising and fine heads; and carefully sowing from their product. H. C.

HEATH.—Claimants, 44. Acres sown, 60 9-16. Product, 1006 bush.
Average per acre, $16\frac{1}{2}$ bush.
Largest crops, 25 bs.; two 24 bs.; four of $22\frac{1}{2}$ bs.; one of $21\frac{1}{2}$ one of 21 bush. per acre.

REMARKS. Largest crops without manure this season; but followed corn or potatoes well manured. Two cases of 30 bs. ashes applied; crops $15\frac{1}{2}$ bs. per acre. Crop of 25 bs. Italian; crop of 24 bs. Black Sea variety. Two hundred bs. raised more than returns, that were not in quantities to secure the bounty. Large portion of crops injured by smut; in such cases the seed not steeped in brine, but simply rolled in ashes.

LEVERETT.—Claimants, 3. Acres sown, 6. Product, $79\frac{3}{4}$ bush.
Average per acre, 13 1-6 bush.
Crops, 16 bs.; $15\frac{3}{4}$ bs.; 12 bs. per acre.

REMARKS. The crop of 16 bs. with two bs. of lime, and one of plaster. Crop of $15\frac{3}{4}$ bs. with 13 loads of manure per acre. One injured by drought.

LEYDEN.—Claimants, 22. Acres sown, $37\frac{1}{2}$. Product, $518\frac{1}{2}$ bush.
Average per acre, 13 25-37 bush.
Largest crops, three of 19 bs.; one of $18\frac{3}{4}$ bs.; two of 18 bs.; one of $17\frac{1}{2}$ bush. per acre.

REMARKS. Crop of $17\frac{1}{2}$ bs. with 30 bs. ashes per acre. Others without manure.

MONTAGUE.—Claimants, 9. Acres sown, 11 7-12. Product, 171 bush.
Average per acre, $14\frac{1}{2}$ bush.
Largest crops, 20 bs.; 17 bs.; $16\frac{1}{2}$ bs.; 16 bush. per acre.

REMARKS. Crop of 20 bs. received one cask of lime.

MONROE.—Claimants, 2. Acres sown, $2\frac{3}{4}$. Product, 40 bush.
Average per acre, 13 5-6 bush.
Crops, $15\frac{1}{4}$ bs.; $13\frac{1}{2}$ bs. per acre.

NEW SALEM.—Claimants, 9. Acres sown, 12 1-6. Product, 203 bush.
Average per acre, 16 bush.
Largest crops, 30 bs.; 20 bs.; 18 bs.; $16\frac{1}{2}$ bs.; two of 16 bush. per acre.

REMARKS. Largest crop without manure. Twenty loads of common manure applied; crop, 10 bs. Two crops injured by drought, one lodged.

NORTHFIELD.—Claimants, 42. Acres sown, $82\frac{1}{8}$. Product, 1100 bush.
Average per acre, $13\frac{1}{4}$ bush.
Largest crops, two of $21\frac{1}{4}$ bs.; two of 20 bs.; one of $19\frac{1}{2}$ bs.; one of 19 bush. per acre.

REMARKS. Largest crops without manure. A crop of winter wheat gave 11½ bs. without injury. Another crop of winter wheat gave 20 bs. without injury. The applications of plaster and lime in small quantities give no discriminating results. In case of 12 bs. of ashes, 16 bs. of wheat were obtained. In case of 9 bs. of ashes and lime, 17 bs. of wheat were obtained. One crop winter killed; sown 20 Sept.

ORANGE.—Claimants, 23. Acres sown, 29. Product, 493 bush.
Average per acre, 17 bush.
Largest crops, 25 bs.; 23 bs.; three of 20 bs.; one of 19 bush.
per acre.

REMARKS. Largest crop had 15 loads of stable manure. Crop of 23 bs. without manure; no accident or injury.

ROWE.—Claimants, 16 Acres sown, 22 2-5. Product, 353 bush.
Average per acre, 15½ bush.
Largest crops, 22 bs.; 19¼ bs.; 18¼ bs.; 18 bush. per acre.

REMARKS. Largest crops without manure. The soil of Rowe is exceedingly rich in vegetable matter. Where 25 loads of barn manure applied, the product 15 bush.

SHELBURNE.—Claimants, 36. Acres sown, 59 5-12. Product 973 bush.
Average per acre, 16 17-59 bush.
Largest crops, 37½ bs.; 25 bs.; 22¾ bs.; 22 bs.; one 21½ bs.
per acre.

REMARKS. The largest crop is reported without remarks; but the farm presents a deep, rich, argillaceous soil and is exceedingly well managed. H. C. Crop of 25 bs. without remarks. Crop of 20 bs. received 20 bs. of ashes per acre.

SHUTESBURY.—Claimants, 2. Acres sown, 3¾. Product, 46 bush.
Average per acre, 12 bush.
Crops, 14 bs.; 11½ bush. per acre.

SUNDERLAND.—Claimants, 20. Acres sown, 32¼. Product, 502 bush.
Average per acre, 15 11-32 bush.
Largest crops, 30 bs.; 24 bs.; 21 bs.; 20 bush. per acre.

REMARKS. Largest crop without manure; soil sandy loam. With 10 loads compost manure, the crop 17 bs. Several cases of the use of ashes, plaster, and lime; without discriminating results. Two cases of injury from worms, one from drought.

WARWICK.—Claimants, 20. Acres sown, 30¾. Product, 675½ bush.
Average per acre, 16¾ bush.
Largest crops, 28 bs.; 22¾ bs.; 22½ bs.; 22 bs.; one 21½ bs.
per acre.

REMARKS. The largest crop with 16 bs of ashes. The crop of 22½ bs. with thirty loads green barn manure, and seven bs. of lime. Another crop of 22¾ bs. without manure. One case of grain insect. Soil "dry and various."

WENDELL.—Claimants, 2. Acres sown, 5. Product, 55½ bush.
Average per acre, 11 bush.
Crops, 14½ bs. ; 9 bush. per acre.

WHATELY.—Claimants, 4. Acres sown, 8. Product, 89 bush.
Average per acre, 11½ bush.
Largest crops, 16 bs. ; 11¾ bs. ; 10 bs. per acre.

REMARKS. Largest crop had 12 bs. lime and ashes. One crop injured by worm ; three by drought ; ten bushels of lime per acre ; yield nine bush. Five loads of stable manure and six bs. of ashes ; crop, ten bush.

HAMPSHIRE COUNTY.

AMHERST.—Claimants, 38. Acres sown, 76 5-12. Product, 1211 bush.
Average per acre, 15 15-19 bushels.
Largest Crops, 32 bs. ; 27 bs. ; 25½ bs. ; 24 bs. ; 23½ bs. ; 23 bs. ;
two 22 bs. per acre.

REMARKS. 21 crops of winter wheat—one crop injured by grain-worm—one by storm, without other accident or injury. Largest crop of 32 bushels spring wheat—the other largest crops, winter wheat. The winter wheat, sown between 15th Sept. and 20th Oct. One acre with 10 loads yard manure and 10 bush. of ashes—Crop 23 bush. One with 9 loads of muck—Crop 24 bush. Two crops of 21 bush. each with 4 bush. of lime each. Largest crop, 32 bush. on an "old loam" ; no manure. Two cases of smut, seed not prepared—one, where it was soaked and lined ; but the kind of steep not mentioned. The soil is various—gravelly, clay loam, and sandy loam—Two or three crops shrunk—one injured by storm. Spring wheat sowed from 31st March to 3d May.

BELCHERTOWN.—Claimants, 13. Acres sown, 31¼. Product, 464½ bs.
Average per acre, 14¾ bushels.
Largest crops, 22¾ bs. ; 20 bs. ; 12 bs. per acre.

REMARKS. The largest crop with barn-yard manure—quantity not stated. Returns imperfect.

CHESTERFIELD.—Claimants, 42. Acres sown, 85. Product, 1333 bush.
Average per acre, 15½ bushels.
Largest crops, 25 bs. ; 21 bs. ; five 20 bs. ; four 19 bs. ;
seven 17 bs. per acre.

REMARKS. Largest crop without manure ; a gravelly loam. With 15 loads sheep manure and 5 bush. ashes, yield 21 bush. One case of smut, seed "brined and limed."—14 bush. of lime in one case ; crop $8\frac{1}{2}$ bush per acre—20 bush. ashes, the yield 20 bush. per acre—20 bush. in another case, the yield 17 bush. per acre.

CUMMINGTON.—Claimants, 47. Acres sown, $78\frac{1}{2}$. Product, 1211 bush.
Average per acre, $15\frac{3}{8}$ bushels.
Largest crops, 24 bs. ; $23\frac{1}{2}$ bs. ; 22 bs. ; 21 bs. ; two 20 bs. per acre.

REMARKS.—Largest crop with five loads long manure, and seven bs. ashes. Two cases of smut ; seed steeped in brine, not limed. One case of smut, no preparation of the seed. The soil here rests on mica slate. The manures applied to the crop of corn or potatoes of the preceding year. In two cases the seed steeped in a solution of "vitriol." Two cases of injury from grain-worm ; several by drought. The seed used, the Leghorn or Tea Wheat.

EASTHAMPTON.—Claimants, 15. Acres sown, $27\frac{1}{4}$. Produce, 535 bush.
Average per acre, 19 6-27 bushels.
Largest crops, 25 bs. ; 23 bs ; four of 20 bs. ; two of 19 bs. per acre.

REMARKS. Fourteen cases of winter wheat—sowed from 17th Sept. to 2d Oct. No accident. Largest crop on sandy loam without manure.

ENFIELD.—Claimants, 3. Acres sown, $5\frac{1}{4}$. Product, $75\frac{1}{2}$ bush.
Average per acre, 14 bushels.
Crops, 17 3-5 bs. ; $16\frac{1}{2}$ bs. ; $9\frac{3}{4}$ bs. per acre.

REMARKS. Largest crop with 15 loads barn-yard manure—"badly shrunk."

GOSHEN.—Claimants, 32. Acres sown, 52. Product, 646 bush.
Average per acre, 12 11-26 bushels.
Largest crops, 16 bs. ; $15\frac{1}{2}$ bs. ; 15 bs. per acre.

REMARKS. One case of injury from drought. Returns imperfect.

GRANBY.—Claimants, 3. Acres sown, 3. Product, $44\frac{1}{2}$ bush.
Average per acre, $14\frac{3}{8}$ bushels.
Crops, 20 bs. ; $16\frac{1}{2}$ bs. per acre.

REMARKS. One crop, only half the seed vegetated—seed steeped, but no particulars given.

GREENWICH.—Claimants, 7. Acres sown, $12\frac{3}{4}$. Product, 146 bush.
Average per acre, $11\frac{1}{2}$ bushels.
Largest crops, 26 bs. ; 21 bs. 28 qts. per acre.

REMARKS. On largest crop, 50 lbs. of plaster, sown after it was up. Winter wheat gave 12 bush. per acre—without injury.

HADLEY.—Claimants, 53. Acres sown, 140 19-24. Product, 1813½ bush.

Average per acre, 12 5-7 bushels.

Largest crops, 23¼ bs.; two of 22 bs.; one 21½ bs.; two 20 bs. per acre.

REMARKS. Largest crop without manure; six bush. lime applied; blasted. Nineteen crops of winter wheat; one injured by winter. Two cases of smut; seed rolled in lime, not steeped. Two cases of Italian wheat; one kept in brine 30 hours; one said to have been injured by steeping. This agrees with the experience of some of the farmers of Northampton, who think that the seed of the Italian wheat, being thin skinned, is injured by remaining a long time in the brine. The Italian, in this case, yielded but 2¼ bush—the winter wheat, on the same farm, sowed Sept. 23, produced 16 bush. per acre. Three cases in this town of the cultivation of 5 acres and upwards by a single farmer. The soil a sandy loam and alluvial—one case with 20 bush. lime, plaster and ashes per acre—crop blasted.

HATFIELD.—Claimants, 39. Acres sown, 102. Product, 1559 bush.

Average per acre, 14 1-5 bush.

Largest crops, 25½ bs.; 23½ bs.; 22 2-13 bs.; 20¾ bs.; 20 2-5 bs. per acre.

REMARKS. Largest crop on alluvial, rich loam; six bush. ashes. Crop injured by clover sowed with it. Another crop is stated to have been much injured by grass, (we suppose, sowed with it.) Three cases of winter wheat, from quarter to half killed by winter. Seventeen cases of winter wheat reported; most of them in same field with spring wheat, but no comparative results given, except as above. Several cases reported in which a part of the field manured and part without manure; yet no comparative results given, but all reported as one. These were favorable cases for determining important points; but we are left in the dark. A crop sowed 20th Nov. gave heavy growth of straw, but “did not fill.”

It is much to be lamented, that, with the Hatfield farmers among the best in the State, with so many favorable opportunities of arriving at important comparative results, the accounts are not definite and establish nothing.

MIDDLEFIELD.—Claimants, 14. Acres sown, 18 6-8. Product, 282 bush.

Average per acre, 15 5-18 bush.

Largest crops, 21 bs.; 20 bs.; 18 bs.; 16 bush. pr. acre.

REMARKS. Largest crop with seven loads manure and seven bs. of lime, Applications of lime in small quantities; but no decisive result. One case of smut; seed rolled in lime; not steeped.

NORTHAMPTON.—Claimants, 59. Acres 176 5-12. Product, 1938½ bush.

Average per acre, 10 21-22 bush.

Largest crops, 20 bs.; 19½ bs.; 18 bs.; two of 17½ bush. per acre.

REMARKS. Largest crop without manure on sandy loam. Sixteen loads of barn manure and four bs. of ashes upon two acres; crop, 16 bs. per acre. Several cases of application of lime; no decisive results. No accident or injury.

NORWICH.—Claimants, 14. Acres sown, $22\frac{1}{2}$. Product, 269 bush.
Average per acre, 11 17-22 bush.
Largest crops, 20 bs.; 19 bs.; $18\frac{1}{2}$ bs.; 15 bs.; 13 bush. per acre.

REMARKS. Crop of 20 bs. with two bs. of lime and ten of ashes. No accident or injury.

PELHAM.—Claimants, 2. Acres sown, $3\frac{1}{4}$. Product, 31 bush.
Average per acre, $9\frac{3}{4}$ bush.
Crops, $21\frac{1}{2}$ bs.; 6 bush per acre.

REMARKS.—In case of largest crop, part manured, part without manure; both after corn; no difference observable in the yield.

PLAINFIELD.—Claimants, 16. Acres sown, 26 13-24. Product, 372 bush.
Average per acre, 13 11-13 bush.
Largest crops, $21\frac{1}{2}$ bs. 21 bs. 20 4-5 bs. 18 bush. per acre.

REMARKS. Largest crops without manure. Three cases of smut; one, seed without preparation; one, seed steeped in water and rolled in lime, one, seed soaked in brine.

PRESCOTT.—Claimants, 3. Acres sown, 2 9-80. Product, 52 bush.
Average per acre, $24\frac{1}{2}$ bush.
Largest crops, 34 bs. per acre; one 18 bs. to 108 rods.

REMARKS. Largest crop on black loam with four loads green manure, and 100 lbs. plaster.

SOUTH HADLEY.—Claimants, 16. Acres sown, 41. Product, 612 bush.
Average per acre, 14 38-41.
Largest crops, 25 bs.; 20 bs.; two of 16 bush. per acre.

REMARKS. Largest crop without manure. A crop stated to yield from 10 to 25 bs. per acre, received one bushel of plaster, and forty bs. of ashes upon five acres. Five cases of grain worm.

SOUTHAMPTON.—Claimants, 10. Acres, $21\frac{1}{2}$. Product, 280 bush.
Average per acre, 13 2-21 bush.
Largest crops, $20\frac{1}{4}$ bs.; 16 bs.; 14 bs.; $11\frac{1}{2}$ bs.; $11\frac{1}{4}$ bush. per acre.

REMARKS. Largest crop without manure. Sixteen loads of manure, and two bs. of ashes per acre; yield, 16 bush.

WARE.—Claimants, 10. Acres sown, 16. Product, 204 $\frac{1}{4}$ bush.

Average per acre, 12 $\frac{3}{4}$ bush.

Largest crops, 19 $\frac{1}{4}$ bs. ; one 16 $\frac{2}{3}$ bs. ; one of 15 18-32 bs. ; one of 13 3-5 bush. per acre.

REMARKS. Largest crop with eight loads of stable manure, and two bs. of lime. Seven loads of stable manure, and ten bs. of ashes ; yield, 15 $\frac{1}{2}$ bs. per acre. One case of grain insect.

WESTHAMPTON.—Claimants, 12. Acres sown, 19 $\frac{1}{2}$. Product, 228 bush.

Average per acre, 11 9-19 bush.

Largest crops, 18 $\frac{1}{2}$ bs. ; 17 $\frac{1}{2}$ bs. ; 16 bs. ; 15 bush. per acre.

REMARKS. Largest crop with a compost of ashes, earth and lime.

WILLIAMSBURGH.—Claimants, 9. Acres, 18 67-120. Product, 239 $\frac{1}{4}$ bs.

Average per acre, 13 2-9 bush.

Largest crops, 21 bs. ; two of 16 bs. ; one of 15 bs. ; 14 $\frac{1}{2}$ bush. per acre.

REMARKS. The largest crop with 14 bs. of lime to the acre. One case of smut ; seed without preparation. With one exception crops suffered severely by drought.

WORTHINGTON.—Claimants, 59. Acres sown, 85. Product, 1487 $\frac{1}{4}$ bush.

Average per acre, 17 $\frac{1}{2}$ bush.

Largest crops, 26 $\frac{1}{2}$ bs. ; two of 25 bs. ; one of 23 $\frac{1}{2}$ bs. ; 22 $\frac{1}{2}$ bs. ; 22 bush. per acre.

REMARKS. The largest crops without manure. The soil "loamy." No accident nor injury.

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BLANDFORD.—Claimants, 14. Acres sown, 19 1-10. Product, 272 bush.

Average per acre, 14 6-19 bush.

Largest crops, 22 bs. ; 21 bs. ; 20 bs. ; 19 bush. per acre.

REMARKS. No manure on largest crop ; 2 bs. of ashes. Crop of 21 bs. with 18 loads barn yard manure. 20 loads of yard manure upon two acres, gave 8 bs. per acre ; sowed from 1 to 10th May.

BRIMFIELD.—Claimants, 10. Acres sown, 17. Product, 214 $\frac{1}{2}$ bush.

Average per acre, 12 10-17 bush.

Largest crops, 18 $\frac{1}{2}$ bs. ; two of 17 bs. ; two of 15 bs. ; one of 12 bush. per acre.

REMARKS. Largest crop no manure. Twelve loads of compost per acre ; crop, 17 bush. Seven cases of rust.

CHESTER.—Claimants, 25. Acres sown, 39 11-12. Product, 554½ bush.

Average per acre, 13 34-39 bush.

Largest crops, 29½ bs. ; three of 18½ bs. ; 17½ bs. ; 17 bush. per acre.

REMARKS. Largest crop with seven bush. of ashes ; no manure. Eight loads of coarse manure ; crop, 13 3-5 bush. One case of being lodged. One of being shrunk.

GRANVILLE.—Claimants, 2. Acres sown, 3¼. Product, 35½ bush.

Average per acre, 9¾ bush.

Crops, 20 bs. ; 6¾ bush. per acre.

LONGMEADOW.—Claimants, 13. Acres sown, 30¼. Product, 349 bush.

Average per acre, 11½ bush.

Largest crops, 21½ bs. ; 17 bs. ; three of 16 bs. ; one of 15½ bush. per acre.

REMARKS. Largest crop on sandy loam ; sowed after corn ; winter wheat. Two cases of smut ; no preparation of the seed. Six cases of winter wheat.

LUDLOW.—Claimants, 3. Acres sown, 5 23-40. Product, 107¾ bush.

Average per acre, 18 3-5 bush.

Crops, 26 bs. ; 18 bs. 20 qts ; 14 bush. per acre.

REMARKS. Largest crop on loamy old land ; after corn which had 35 loads of manure per acre. All the crops affected by worm.

MONSON.—Claimants, 5. Acres sown, 11¼. Product, 149 bush.

Average per acre, 12 7-11 bush.

Crops, 24 bs. ; 17 bs. ; 11 bs. ; one of 10 bush. per acre.

REMARKS. Largest crop with 4 loads of horse manure on ¾ of an acre. Four crops suffered by drought.

MONTGOMERY.—Claimants, 10. Acres sown, 22½. Product, 256 bush.

Average per acre, 11 2-11 bush.

Largest crops, 17 bs. ; 16 bs. ; 14 bs. ; 13 bush. per acre.

REMARKS. The largest crop without manure.

RUSSELL.—Claimants, 1. Acres sown, 1½. Product, 15¼ bush.

Average per acre, 11 14-32 bush.

Crop, 11 14-32 bush. per acre.

SPRINGFIELD.—Claimants, 14. Acres sown, 31 $\frac{3}{8}$. Product, 560 $\frac{1}{2}$ bush.

Average per acre, 17 19-31 bush.

Largest crops, 40 bs.; 26 bs.; 25 bs.; 23 bs.; three of 20 bush. per acre.

REMARKS. The largest crop, probably the largest grown in the state, was winter wheat sowed last of September on common loam, and dressed with fifteen or sixteen cart loads of common yard manure on 1 $\frac{1}{2}$ acre. One crop injured one half by the winter, sowed on 10th October. One case of injury by grain worm. The other crops without injury. Seven crops on "intervale."

TOLLAND.—Claimants, 4. Acres sown, 5 $\frac{1}{4}$. Product, 72 28-32 bush.

Average per acre, 12 2-5 bush.

Crops, 20 bs.; 17 $\frac{7}{8}$ bs.; 10 $\frac{3}{8}$ bush. per acre.

REMARKS. Largest crop with 4 loads of barn manure, and 4 of leached ashes. One case of smut; seed soaked in brine.

WILBRAHAM.—Claimants, 19. Acres sown, 39 $\frac{3}{8}$. Product, 545 bush.

Average per acre, 13 $\frac{5}{8}$ bush.

Largest crops, 20 $\frac{5}{8}$ bs.; 20 bs.; 19 $\frac{1}{2}$ bs.; 18 $\frac{1}{2}$ bush. per acre.

REMARKS. Largest crop with 15 loads of barn yard manure per acre, and 1 $\frac{1}{2}$ bs. of plaster sown with the wheat. After it came up one bush. more applied.

One case of smut followed no preparation of the seed.

"	"	"	"	steeping 6 hours in water and ashes applied.
"	"	"	"	steeping in ley ashes and rolling in plaster.
"	"	"	"	steeping in brine and rolling in plaster.
"	"	"	"	scalded in brine and rolled in plaster and sowed immediately.

WESTFIELD.—Claimants, 20. Acres sown, 38 1-24. Product, 623 bush.

Average per acre, 16 5-38 bush.

Largest crops, 30 bs.; 28 bs.; 27 1-5 bs.; 23 bs.; one 22 bush. per acre.

REMARKS. Largest crop on "meadow land" without manure; winter wheat. Twelve crops of winter wheat sowed from 15 Sept. to Nov. 10, without injury from winter. One case of blight. One of grain worm. 110 bs. leached ashes per acre applied on "plain land." On 5 acres, product 21 bs. per acre.

W. SPRINGFIELD.—Claimants, 58. Acres, 110 93-160. Prod. 2336 $\frac{1}{2}$ bs.

Average per acre, 21 1-25 bush.

Largest crops, 35 bs.; two of 28 bs.; one of 26 $\frac{1}{2}$ bs.; 24 $\frac{1}{2}$ bs.; 24 bush. per acre.

REMARKS. Fifty-three of these crops winter wheat. Largest crop followed corn which had been manured with eight loads per acre; sown the 2d Oct. The time of sowing of the crops varied from 15th Sept. to 16th Oct. The amount of seed varied from $1\frac{1}{2}$ to 2 bs. per acre. In one case on alluvial land, 12 Tons yard manure applied upon $1\frac{1}{4}$ acre; crop 24 bush. per acre. In three cases the wheat injured by winter; 18 cases of injury from grain worm. Several by drought. One crop choked by weeds. In one case of 27 bs. the crop dressed with "fine manure." 150 bs. of leached ashes applied in one case; the yield 16 bush.

COUNTY OF WORCESTER.

ASHBURNHAM.—Claimants, 64. Acres sown, 100 $\frac{3}{4}$. Product, 1459 $\frac{1}{2}$ bs.
Average, $14\frac{1}{2}$ bs. per acre.

Crops, two of 23 bs. each; one 22 bs.; two 21 $\frac{1}{2}$ bs.; two 20 bs.

REMARKS. One of the largest crops with 8 loads compost manure. The other none, and condition of land not given. 21 $\frac{1}{2}$ bushels with 8 bushels of ashes, and one cask of lime. Five cases of smut.

ATHOL.—Claimants, 13. Acres sown, 19 $\frac{1}{2}$. Product, 318 $\frac{1}{2}$ bushels.
Average, 16 $\frac{1}{4}$ bs.

Crops, two of 24 bs.; one, 20 bs.; 19 bs. per acre.

REMARKS. Eight bushels of lime and 8 bushels of bone manure applied; the crop 15 $\frac{1}{2}$ bushels; the soil wet and hard. Two cases of smut. In one, seed prepared in ashes. In other, washed in salt water.

AUBURN.—Claimants, 1. Acres sown, 3 $\frac{1}{2}$. Product, 34 bushels.
Average, 9 5-7 bs.

REMARKS. 2 $\frac{1}{2}$ casks of lime applied to whole ground. On one half an acre 23 $\frac{1}{2}$ bushels obtained from one bushel sown of the Black Sea variety. Soil, sandy loam. Land manured the previous year.

BARRE.—Claimants, 33. Acres sown, 40 $\frac{1}{2}$. Product, 840 $\frac{1}{4}$ bushels.
Average 20 $\frac{1}{2}$ bs.

Crops, 32 $\frac{1}{2}$ bs.; 32; 28; 27 bs.; two of 24 bs.; one of 22 bs.; one of 21 $\frac{1}{2}$; five of 20 bs.; one of 19 $\frac{1}{4}$ bs.

REMARKS. Largest crops with compost, 10 to 20 loads per acre. 42 loads of compost applied; the crop 11 $\frac{3}{4}$ bushels. 12 bushels ashes, the crop 14 bushels. The land in some parts of Barre, is a deep rich loam, charged with vegetable matter, and strongly tenacious. The plain lands near the factory, light and sandy. Small applications of lime and plaster, but no decisive results. Two cases of grain-worm. One of injury from Roman wormwood. Four badly lodged. One blasted.

BERLIN.—Claimants, 3. Acres sown, $5\frac{1}{4}$. Product, 93 bushels.
Average, $18\frac{1}{2}$ bs.
Crops, $20\frac{1}{4}$ bs. ; 20 bs.

REMARKS. 200 lbs. plaster spread ; crop injured by drought.

BOLTON.—Claimants, 14. Acres sown, $23\frac{1}{2}$ bs. Product, $353\frac{1}{2}$ bs.
Average, 15 1-6 bs. per acre.
Crops, 21 bs. ; $19\frac{1}{2}$ bs. ; 19 bs. ; two of 16 bs.

REMARKS. Largest crop with 20 loads of manure and 8 bushels of lime. With 25 bushels ashes, product 16 bushels. Crops suffered much by drought. Several applications of lime ; the results are different, and determine nothing as to its efficiency.

BOYLSTON.—Claimants, 12. Acres sown, 12. Product, 225 bs.
Average, $18\frac{1}{2}$ bs. per acre.
Crops, three of $21\frac{1}{2}$ bs. ; two of 20 bs. ; one of 18 bs.

REMARKS. With 15 bushels ashes, the yield was 15 bushels. Crops of $21\frac{1}{2}$ bushels, with 8 loads of barn manure. The soil loamy.

BROOKFIELD.—Claimants, 19. Acres sown, $25\frac{1}{2}$. Product, $486\frac{1}{2}$ bs.
Average, $19\frac{1}{4}$.
Crops, 28 bs. ; 26 bs. ; 25 bs. ; 24 bs. ; two of 22 bs. per ac.

REMARKS.—Largest crop without manure on sandy loam. Crop of $19\frac{1}{2}$ bushels had 7 loads of compost manure. Six bushels of lime, the crop $17\frac{1}{2}$ bushels per acre. One case of grain insect. One rust. The hill lands in Brookfield, if properly cultivated, are favorable to wheat.

CHARLTON.—Claimants, 16. Acres sown, $18\frac{1}{2}$. Product, 337 bs.
Average, $18\frac{1}{2}$ bushels per acre.
Crops, $23\frac{1}{2}$ bs. ; 21 bs. ; 20 bs. ; three of 18 bs.

REMARKS. Largest crop with “30 loads of summer manure, and 30 loads of green manure.” The land is designated dry or moist ; but the observations indefinite.

DANA.—Claimants, 6. Acres sown as returned, $5\frac{1}{2}$, the whole not reported.
Product, 100 bushels.

Average, 13 bs.

Largest crop, 15 bs.

REMARKS. Two hundred lbs. of plaster applied, the crop, 11 bushels.

DOUGLAS.—Claimants, 3. Acres sown, $4\frac{1}{2}$. Product, $66\frac{1}{2}$
Average, $13\frac{1}{2}$ bs.
Largest crop, $17\frac{1}{2}$ bs.

REMARKS. Largest crop manured with 7 loads of long manure.

DUDLEY.—Claimants, 1. Acres sown, 1½. Product, 23½ bushels.
Average, 15⅔ bs. per acre.

FITCHBURG.—Claimants, 51. Acres sown, 84 5-6. Product, 1352 bs.
Average, 15½ bs. per acre.
Crops, 30 bs.; 26 bs.; 24 bs.; 23 bs.; 22½ bs.; 22 bs.; two of 20 bs.

REMARKS. Crop of 30 bushels of the Black Sea variety; soil, deep loam; with six loads barn manure. This was on land of Payson Williams, who introduced the Black Sea wheat into the country, and received a premium from Massachusetts Society for a product of 55 bushels of this kind of wheat per acre. In the application of 6, 15, 8, and 20 bushels of ashes to the acre, the crops varied from 8 to 18 bushels per acre, without observable relation to amount of ashes applied. With 30 bushels of lime and 25 loads of manure, the yield 16½ bushels. In most cases, the land manured liberally the previous year. The Black Sea wheat gave, in general, the best crops; but it was not invariably so; in one it gave a crop of only 8 bushels, on a moist soil without manure.

GARDNER.—Claimants, 11. Acres sown, 14. Product, 272½ bushels.
Average, 19 3-7 bs. per acre.
Crops, 28 bs.; 26 bs.; 25 bs.; two, 22 bs.; one, 21 bs.

REMARKS. Crop of 28 bushels, no manure this season. Of 26 bs., 10 loads compost. Of 22 bushels, 36 loads of compost. 7 bushels lime and one of plaster without manure, the product 18 3-5 bushels. Six crops suffered by drought.

GRAFTON.—Claimants, 12. Acres sown, 18½. Product, 246 bushels
Average, 13⅔ bs. per acre.
Crops, 23½ bs. of 17½ bs. per acre.

REMARKS. Largest crop on hill land, without manure, one bushel of slacked lime sowed upon it, when three inches high, in potatoes previous year highly manured. With 15 loads of barn manure, yield 13 bushels. One case of rust, and one of wheat insect.

HARDWICK.—Claimants, 37. Acres sown, 45½. Product, 872 bs.
Average, 18 7-9 bs. per acre.
Crops, 4 of 26 bs.; two of 25 bs.; two of 24 bs.; three of 22 bs.; two of 21 bs.; five of 20 bs. per acre.

REMARKS. Largest crops had no manure; but on one, one cask of lime and five bushels of plaster applied. Large part of the crops lodged. The soil in Hardwick is deep, loamy, and productive, full of stones; and no where is there more agricultural zeal, nor more resolution and industry in overcoming the natural obstacles.

HARVARD.—Claimants, 31. Acres sown, 54. Product, 751½ bs.

Average, 13¾ per cent.

Crops, 22¾; two crops of 22 bs.; one of 19 bs.

REMARKS. Lands highly manured; wheat followed corn or potatoes. Crops suffered from drought. With 20 bushels ashes on a sandy loam crop 22 bushels. On a gravelly loam with 17 bushels of ashes crop 12 5-6 bushels per acre. Crops suffered from worms and drought.

HOLDEN.—Claimants, 12. Acres sown, 21¾. Product, 386¼ bushels.

Average, 17 bs. per acre.

Crops, 25 bs.; 24 bs.; 21 bs.; two of 20 bs.

REMARKS. With 65 loads of manure, 19 bushels per acre; 25 loads of manure 18 bushels per acre.

HUBBARDSTON.—Claimants, 6. Acres sown, 7½. Product, 130 bs.

Average, 17½ bs. per acre.

Crops, 20¼ bs.; two of 20 bs.; two of 15 bs. per acre.

REMARKS. Crop of 25¼ and 20 bushels, each ten loads of compost manure. Crop of 20 bushels, no manure.

LANCASTER.—Claimants, 24. Acres sown, 51½. Product, 640 bs.

Average, 12½ bs. per acre.

Crops, 23 bs.; two, 20 bs.; one, 19 bs.; two, 18 bs.

REMARKS. Largest crop on alluvial land without manure. With 20 loads of manure on one acre of sandy loam; crop, 10¾ bushels. Two crops overrun with wormwood. Many suffered by drought. With 275 lbs. plaster applied, crop, 12 bushels.

LEICESTER.—Claimants, 4. Acres sown, 4½. Product, 68½ bushels.

Average, 16 1-7 bs. per acre.

REMARKS. Largest crop, 17 bushels, manured with 15 loads compost.

LEOMINSTER.—Claimants, 80. Acres sown, 143½. Product 2411 bs.

Average, 16¾ bs. per acre.

Crops, 34½ bs.; 28 bs.; 26 bs.; two of 25 bs.; one, 24½ bs.; three of 23 bs.; seven of 22 bs.; two of 21½ bs.; twelve of 20 bs. per acre.

REMARKS. The largest crop on a deep loam. Four cases of the application of horn shavings; but how applied or precisely what quantity not stated. On a deep loam, they yield 21½ bushels per acre. On a gravelly loam, 17 bushels. Two loads of horn shavings applied on a gravelly loam, the crop was 16 lbs. per acre. These applied to the preceding crop. Seven cases of grain worm.

LUNENBURGH.—Claimants, 39½. Acres sown, 52½. Product, 972 bs.
Average, 18½ per acre.
Crop 34 bs.; 26½ bs.; 26 bs.; 24½ bs.; three of 20 bs.;
two of 19½ bs.; two of 19 bs. per acre.

REMARKS. Largest crop Black Sea wheat; land manured the previous year; 300 lbs. plaster on the grain. Crop of 26½ bushels manured with 180 bushels leached ashes. Of 26 bs. had 4 loads of barn manure and 8 bushels of ashes. 24½ bushels per acre had 2 loads of barn manure and 120 bushels of leached ashes. 50 bushels of lime applied to an acre of yellow loam; the crop 17 bushels.

MENDON.—Claimants, 5. Acres sown, 7. Product, 99¾ bushels.
Average, 14 2-7 bs. per acre.
Crops, 21 bs.; 18½ bs.

REMARKS. The largest crop on a black loam, with 9 loads compost, and 24 bushels ashes. With 20 loads coarse manure, and one hhd. of lime, on light loam, crop 14½ bushels per acre.

MILFORD.—Claimants, 4. Acres sown, 6¾. Product, 76½ bushels.
Average, 11¼ bs. per acre.
Largest crop, 18 bs.

REMARKS. Infested by an insect which ate the stalk off, under the first joint, (the Hessian fly.) Black sea-wheat and common spring wheat sown upon the same land; the latter blasted, the former sound.

MILLBURY.—Claimants, 12. Acres sown, 20½. Product, 2587 bush.
Average, 12 7-10 bs.
Crops, 20 bs.: 18½ bs.; two of 18 bs. per acre.

REMARKS. With 8 cords stable manure, and one cask of lime, on a light soil, crop 18 bushels. In other cases, no manure; and only two failures which were by drought.

NEW BRAINTREE.—Claimants, 12. Acres sown, 15½. Product, 265¼ bs.
Average, 16 4-5 bs. per acre.
Crops, 21½ bs.; 20½ bs.; two of 20 bs.; one 18 bs.

REMARKS. Largest crop with two loads of manure on dark loam. Crop of 20 bushels received 30 loads of manure. Crop of 20 bushels with ten loads of manure. One crop of 20 bushels, none. Two cases of grain insect.

NORTHBORO'.—Claimants, 10. Acres sown, 24. Product, 341 bs.
Average, 14 1-5 bs. per acre.
Crops, 18 bs.: 17½ bs.; 17 bs.

REMARKS. Crop of 18 bushels with 10 loads barn manure; of 16 bushels with 15 loads to the acre.

NORTH BROOKFIELD.—Claimants, 3. Acres sown, 4. Product, 60½ bs.
Average, 15 bs. per acre.

REMARKS. Crop, 17½ bushels with two hogsheds of lime per acre.

OAKHAM.—Claimants, 2. Acres sown, 1¼. Product, 35 bush.
Average, 20 bs.
Largest crop, 21¼ bushels.

OXFORD.—Claimants, 6. Acres sown, 7½. Product, 134 bushels.
Average, 17 2-7 bs. per acre.
Crops 34 bs.; 18½ bs.

REMARKS. Soil on which the largest crop, a gravelly soil; but no manure. With thirty loads green manure, one bushel lime and 7 bushels of ashes, on a gravelly soil, crop 15 bushels. Crops all sound.

PETERSHAM.—Claimants, 49. Acres sown, 75¼. Product, 1304 bs.
Average, 17¼ bs. per acre.
Crops, 30 bs.; two of 26 bs.; one of 25 bs.; 24 bs.

REMARKS. The largest crop sown on 30th April; clayey soil; without manure. The two crops of 26 bushels on a dry loam without manure; on one, two bushels of lime applied. The crop of 25 bushels with 12 loads green manure. Three cases of smut; in each, the wheat sown dry.

PHILLIPSTON.—Claimants, 31. Acres sown, 39½. Product, 722¾ bs.
Average, 18¼ bs. per acre.
Largest crop 34 bs.; two of 30 bs.; one of 28 bs.; three of 22 bs.

REMARKS. Largest crop on deep loam without manure.

One crop of 30 bush. on a clay loam with 26 loads of manure.

do. do. on light loam without manure.

do. of 28 do. on "loamy land," without manure.

do. of 22 do. on " " with six loads green manure.

Where 10 bushels of ashes spread at time of sowing the crop, 16 bushels. Six crops suffered from drought; one by wire worm; one sown May 10th, by frost.

PRINCETON.—Claimants, 38. Acres sown, 58½. Product, 987 bs.
Average, 17¾ bs. per acre.
Crops, 30 bs.; 26 bs.; two of 25 bs.; three of 23 bs.; one of 22 bs.; four of 21 bs.; five of 20 bs.

REMARKS. The crop of 30 bushels on a loamy soil without manure.

" " of 26 " " " " " "

With 8 loads of rotten manure to the acre, crop 14 bushels.

One case of injury from wheat insect.

“ “ “ “ striped worm—?

ROYALSTON.—Claimants, 42. Acres sown, 60. Product, 1011½ bush.

Average, 16⅔ bs. per acre.

Crops, 30 bs. per acre; 23 bs.; 22½ bs.; 21½ bs.; two of 20 bs. per acre.

REMARKS. Crop of 30 bushels had 14 loads of green manure. Two other cases 20 loads of green manure applied per acre, the yield 13½ bushels; one 14½ bushels per acre. One case of smut, the wheat soaked (it does not name the steep) and brined; and one, the wheat sown dry.

RUTLAND.—Claimants, 22. Acres sown, 28. Product, 591½ bushels.

Average, 15½ bs. per acre.

Crops, 30 bs.; 25 bs.; 24½ bs.; two of 24 bs.; two of 23 bs.; two of 22 bs.

REMARKS. Largest crop, with one load of manure and one hhd. of lime. This “bearded wheat,” which is no designation. Second crop of 25 bushels, with 20 loads of compost and one hhd. of lime. This, Black Sea wheat. One case of 120 loads of horse manure, in a green state, to five acres of land; crop 15 1-5 bushels to the acre. One case of smut; wheat washed in water and limed.

SHREWSBURY.—Claimants, 28. Acres sown, 44 5-6. Product, 587½ bs.

Average, 13 bs. per acre.

Crops 19½ bs.; two of 18 bs.; one of 17½ bs.

REMARKS. Largest crop, manured with 20 loads compost, 2 bushels of plaster, and 6 of ashes, upon 2¾ acres. Two acres 1-16 of the crop smutted, where the seed soaked in brine 24 hours.

SOUTHBIDGE.—Claimants, 22. Acres sown, 31½. Product, 621½ bush.

Average, 19⅔ bs.

Crops, 29 bs.; two of 24 bs.; one of 23 bs.; 22½ bs. 22 bs.; two of 20 bs.; one of 19 bs.

REMARKS. The soil, on which 29 bushels to an acre, a hilly loamy soil; without manure. In a case of application of 8 bush. of ashes, crop 17 bush.
“ “ of 35 loads of swamp mud, the crop 20 bushels; the condition of mud not given

SOUTHBOROUGH.—Claimants, 24. Acres sown, 38½. Product, 614½ bs.

Average, 15¾ bs. per acre.

Crops, 22½ bs.; 21 bs.; three of 20 bs.; one of 18½ bs.

REMARKS. Largest crop without manure on “loam.” Seed, tea wheat. Crop of 21 bushels with 20 bushels of lime, plaster, and ashes mixed in equal proportions, and seed of the Black Sea wheat. Soil, a gravelly loam. Three

crops of 20 bushels each, without manure, and of the Black Sea variety. Several crops "slightly blasted and crippled." The latter designation not clearly understood.

SPENCER.—Claimants, 4. Acres sown, $3\frac{1}{2}$. Product, 867 bushels.

Average, $24\frac{2}{3}$ bushels per acre.

Crops, $33\frac{1}{4}$ bs. per acre; $23\frac{1}{2}$ bs. per acre; 20 bs.; 18 bs.

REMARKS.—Largest crop after corn which received 20 loads of manure and one hogshead of lime. The wheat in general lodged. The soil, a deep loam mixed with gravel. Much agillaceous or clayey matter in these soils.

STERLING.—Claimants, 49. Acres sown, $103\frac{1}{2}$. Product, 1413 bs.

Average, 13 8-9 bs. per acre.

Crops, 25 bs.; 21 bs.; four of 20 bs.; four of 19 bs.; one of $18\frac{3}{4}$ bs. per acre.; nine of 18 bs. per acre.

REMARKS.—Largest crop on moist black loam, with 80 bushels horn shavings. $1\frac{1}{2}$ acres with 60 loads of compost, light and dry soil, gave 21 bushels per acre. Three cases of smut; seed sown dry or rolled in lime or plaster, without other preparation.

STURBRIDGE.—Claimants, 29. Acres sown, $41\frac{1}{4}$. Product, $620\frac{1}{4}$ bs.

Average, $14\frac{3}{8}$ bs. per acre.

Crops, 25 5-7; two of 24 bs.; two of 22 bs.; one of 20 4-5 bs.; one of 20 bs.

REMARKS. Largest crop, a black rich hill soil without manure. With 9 and 10 loads barn manure, crops 13 and 16 bushels per acre; soil light loam. No experiments with lime or plaster, except application in one instance of one peck of lime! Two cases of smut, seed soaked in brine and rolled in plaster. One case of injury from worms. Seven cases of blast without specification.

SUTTON.—Claimants, 24. Acres sown, 24 77-240. Product, 426 bush.

Average per acre, $17\frac{1}{4}$ bush.

Crops, 24 bs.; one of 23 bs.; one of $21\frac{3}{8}$ bs.; one of $21\frac{1}{8}$ bs.; one of 20 4-11 bush. per acre.

REMARKS. Largest crop with ten loads of hog manure. Soil, yellow loam. Crop of $21\frac{3}{8}$ bs. no manure. Soil, black loam. Crop of 20 bs. with 13 bs. of ashes; soil, black loam. Crops almost universally good.

TEMPLETON.—Claimants, 27. Acres sown, 28 31-40. Prod. 545 bush.

Average per acre, $14\frac{1}{2}$ bush.

Crops, 28 bs.; one of 26 bs.; one of $25\frac{1}{8}$ bs.; one of 25 bush. per acre.

REMARKS. Largest crop with three loads of manure. One case of injury from worms, and five from drought.

UPTON.—Claimant, 1. Acres sown, 1. Product, 15 $\frac{3}{4}$ bush.
Average per acre, 15 $\frac{3}{4}$ bush.
Largest crop, 15 $\frac{3}{4}$ bush.

REMARKS. Two bs. of plaster on the crop ; moist soil.

UXBRIDGE.—Claimants, 7. Acres sown, 14 $\frac{1}{2}$. Product, 199 bush.
Average per acre, 13 3-7 bush.
Crops ; 28 bs. ; one of 14 bs. ; one of 11 $\frac{3}{4}$ bs. ; two of 10 bs. per acre.

REMARKS. Largest crop with 18 loads winter manure. With ten loads of barn manure and three hhds. of lime per acre, on light, loamy clay ; crop 10 bs. Every crop suffered from drought.

WARREN.—Claimants, 15. Acres sown, 17 $\frac{1}{4}$. Product, 277 $\frac{3}{4}$ bush.
Average per acre, 15 $\frac{1}{2}$ bush.
Crops, 19 bs. ; two of 18 $\frac{1}{2}$ bs. ; one of 18 bs. ; six of 16 bush. per acre.

REMARKS. Four crops suffered from drought.

WEBSTER.—Claimants, 5. Acres sown, 7 $\frac{1}{2}$. Product, 106 $\frac{3}{4}$ bush.
Average per acre, 13 $\frac{1}{2}$ bush.
Crops, 19 $\frac{1}{2}$ bs. ; one of 19 bs. ; one of 15 $\frac{1}{2}$ bs. ; one of 15 bs. per acre.

WESTBORO'.—Claimants, 17. Acres sown, 30 7-12. Product, 466 $\frac{1}{2}$ bush.
Average per acre, 15 1-10 bush.
Crops, 21 $\frac{1}{2}$ bs. ; one of 20 bs. ; one of 18 $\frac{3}{4}$ bs. ; one of 17 $\frac{1}{2}$ bush. per acre.

REMARKS. Largest crop without manure. Crop of 20 bs. 10 loads of green manure per acre. 15 bs. received two loads of mud per acre. Black sea wheat with 10 bs. lime and one of plaster per acre, produced 16 5-6 bs. per acre.

W. BOYLSTON.—Claimants, 15. Acres sown, 27 $\frac{3}{4}$. Product, 369 bush.
Average per acre, 13 $\frac{1}{2}$ bush.
Crops, 22 bs. ; one of 21 bs. ; one of 18 bs. ; one of 17 bush. per acre.

REMARKS. Largest crop on a very wet soil with ten loads of spring manure. Ten loads of spring manure from under the barn windows, gave 12 bs. on hilly land. One crop eaten by worms.

WESTMINSTER.—Claimants, 32. Acres sown, 47. Product, 771 bush.
Average per acre, 16 19-47 bush.
Crops, 26 bs. ; one of 23 bs. ; one of 22 bs. ; one of 21 bush. per acre.

REMARKS. Largest crop no manure ; the soil loamy. The crops of 23 and 22 bs. no manure ; the soil “loamy.” Two cases of blight.

WINCHENDON.—Claimants, 42. Acres sown, 66 5-24. Product, 972½ bs.
Average per acre, 14¾ bush.

Crops, 25 bs. ; two of 24 bs. ; one of 22 bs. ; one of 21 bush. per acre.

REMARKS. Crop of 25 bs. was on loamy soil with five loads of good manure. Twenty loads of barn manure and 20 bs. of ashes on three acres, on a deep loam ; crop, thirteen bs. to an acre. Crop of 24 bs. no manure. The crops injured by drought.

WORCESTER.—Claimants, 27. Acres sown, 52¼. Product, 749 bush.
Average per acre, 14 1-7 bush.

Largest crops, 29¾ bs. ; 22½ bs. ; one of 19¾ bs ; one of 19½ bush. per acre.

REMARKS. Largest crop of the Black Sea and Italian variety on a clayey soil without manure. With 25 bs. of ashes and 20 loads of barn manure upon four acres ; 14½ bs. per acre. With 100 bs. leached ashes upon two acres on a gravelly loam ; crop, 11½ bs. per acre. With 10 bs. ashes and 10 loads manure per acre ; crop, 16 bs. With 7½ loads of night soil, 1½ bs. of lime, and 1½ bs. of ashes, the crop 14½ bs. per acre on dry loam. With 7½ bs. ashes and 1 half hhd. of lime per acre on dry loam ; the crop 10 bs. One case of grain worm Several cases of injury by drought and worms.

MIDDLESEX COUNTY.

ACTON.—Claimants, 6. Acres sown, 16¼. Product, 178½ bushels.
Average per acre, 10½ bs.

Crops. 17 bs. ; 13¾ bs. ; 13 bs. ; 12 bs. per acre.

REMARKS.—Crop of 17 bushels per acre had ten loads of manure, loamy soil. Crop of 13 bs. on moist loam, ten loads of manure per acre. Crop on dry soil with ten loads of manure, gave seven bushels per acre.

ASHBY.—Claimants, 69. Acres sown, 128¾. Product, 1718¾ bushels.
Average per acre, 14 13-128 bs.

Crops, one of 28 ; two of 20 ; three of 19 ; three of 18 bs. per ac.

REMARKS.—In largest crop the soil “loamy ;” and fifteen loads of barn manure applied. In most cases, lands highly manured with barn manure. No applications of alkaline manure deserving notice. Thirty-five cases of injury by drought. Six cases by grain insect.

One case of injury from smut ; seed soaked in brine and limed.

Two " " " " limed.

" " " " " without preparation.

BOXBORO'.—Claimants, 2. Acres sown, 4. Product, 45 bushels.

Average per acre, $11\frac{1}{4}$ bs.

Crop, 13 3-5 bs. ; 10 2-11 bs. per acre.

REMARKS. Both crops with green manure, 8 loads per acre ; one suffered from drought.

CHELMSFORD.—Claimants, 2. Acres sown, 5. Product, 83 bushels.

Average per acre, 16 3-5 bs.

Crops, 21 ; 9 bs. per acre.

REMARKS. This largest crop on intervale land on the Merrimack. 20 cords of manure applied the previous year. The crop injured by drought. This farmer has been eminently successful in his wheat crop on his lands for twenty years. The soil, as analyzed by Dr. Dana, the result given in the Commissioner's Second Report, is destitute of the carbonate of lime, and contains a slight portion of lime, in the form of sulphate and phosphate. H. C. Seed wheat, soaked in limewater, and rolled in plaster. The smaller crop was on a highly manured "light soil," and very much injured by drought.

CONCORD.—Claimants, 6. Acres sown, $15\frac{1}{2}$. Product, $137\frac{1}{2}$ bushels.

Average per acre, 8 13-15 bushels.

Crops, 25 bs. ; $10\frac{1}{2}$ bs. ; 10 bs. ; $6\frac{1}{4}$ bs. per acre.

REMARKS.—In largest crop, land manured with stable dung the previous year, and $2\frac{3}{4}$ casks of lime applied to the acre. Soil, a dark loam. All the crops suffered from drought. From the raiser of crop above referred to, it is presumed it was on the margin of the finely redeemed meadows in this town, where the soil is deep and full of vegetable matter. H. C.

DRACUT.—Claimants, 8. Acres sown, $15\frac{1}{4}$. Product, $174\frac{1}{4}$ bushels.

Average per acre, 11 bs.

Largest crops, two of 20 bs. ; 12 3-10 bs. ; $11\frac{1}{4}$ bs per acre.

REMARKS. One crop of 20 bushels received 50 loads of barn manure, and one cask of lime. The crop injured by grain insect. Some smut likewise ; the seed soaked in water and rolled in ashes. The soil alluvial, on the banks of the Merrimack. In another case, 30 loads of manure and 2 hhd. of lime ; the crop, 10 2-5 bushels. In another case of 20 bushels per acre, "a light intervale," no manure applied. With this exception, the crops all represented as "shrunk."

DUNSTABLE.—Claimants, 3. Acres sown, 3 97-165. Product, 62 bs.

Average per acre, $16\frac{1}{3}$ bs.

Crops, 19 bs. ; 17 bs. ; 15 bs. per acre.

REMARKS. Nothing definite stated ; and no accident nor injury.

FRAMINGHAM.—Claimants, 21. Acres sown, $37\frac{1}{2}$ Product, 454 bush.
Average, per acre, 12 bush.
Largest crops, 18 bs.; 17 bs.; $16\frac{1}{2}$ bs.; $16\frac{1}{8}$ bush. per acre.

REMARKS. Nothing definite in regard to cultivation or manures, except in one case; 9 loads of manure applied and the land “limed;” the crop 16 bs. per acre.

GROTON.—Claimants, 2. Acres sown, $3\frac{1}{2}$. Product, $51\frac{1}{4}$ bush.
Average per acre, 13 bush.
Crops, 15 bs.; 14 bush. per acre.

REMARKS. Crop of 15 bs. with 12 loads barn yard manure. Crop of 14 bs had 12 loads from hog’s pen. No accident nor injury. Much soil of this highly improved town is favorable to wheat. H. C.

HOLLISTON.—Claimants, 13. Acres sown, $20\frac{1}{4}$. Product, 292 bush.
Average per acre, 14 1-10 bush.
Largest crops, 22 bs.; $21\frac{1}{4}$ bs.; 20 bs.; $16\frac{3}{8}$ bs. per acre.

REMARKS. Largest crop with eleven loads of green manure per acre. Crop of $21\frac{1}{4}$ bs. with eight loads green manure per acre. Five casks of lime and twenty loads of manure in another case; crop, $12\frac{2}{3}$ bs. Three cords of green manure and 15 bs. ashes; crop, 16 bs. per acre. No accident nor injury. The soil represented “good;” in one case “clay;” in one “sandy;” and “dry.”

HOPKINTON.—Claimants, 7. Acres sown, 16 9-10. Product, 205 bush.
Average per acre, 12 bush.
Largest crops, $21\frac{1}{2}$ bs.; $14\frac{1}{2}$ bs.; 13 bush. per acre.

REMARKS. Crop of $21\frac{1}{2}$ bs. with $1\frac{1}{2}$ cords of green manure per acre.

LITTLETON.—Claimants, 11. Acres sown, 12 5-6. Product, 216 bush.
Average per acre, $16\frac{1}{4}$ bush
Largest crops, $19\frac{1}{2}$ bs.; 15 bs.; 14 bs.; $13\frac{1}{2}$ bush. per acre.

REMARKS. One case of smut; no preparation of seed. Small amount of lime applied in one case on sandy loam, “but no difference in this case perceptible” between the limed and the unlimed.

MARLBORO’.—Claimants, 7. Acres sown, 13. Product, 184 bush.
Average per acre, 14 2-13 bush.
Largest crops, 17 bs.; three of 16 bs.; one of $14\frac{1}{4}$ bush. per acre.

REMARKS. The soils in this town in many parts of superior quality; but no extraordinary attention paid to this crop. H. C.

NATICK.—Claimants, 4. Acres sown, $4\frac{1}{2}$. Product, 65 bush.

Average per acre, 16 bush.

Crops, $16\frac{1}{2}$ bs.; $16\frac{1}{4}$ bs.; $15\frac{1}{2}$ bs.; 14 7-10 bush. per acre.

REMARKS. The crop of $16\frac{1}{2}$ bs. with 5 cords of stable manure and two casks of lime. The crop suffered from weeds; flour "of the best quality." In one case the seed prepared in lime water, the crop perfect; but where seed sown dry, the crop "blasted." In every case the lands heavily dressed with green stable manure; in three cases an average of two hhds. of lime per acre. Three cases of blight.

NEWTON.—Claimants, 5. Acres sown, $9\frac{1}{2}$. Product, 110 bush.

Average per acre, 11 1-9 bush.

Crops, 15 bs.; 14 bs.; $12\frac{3}{8}$ bs.; 10 bush. per acre.

REMARKS. One case of smut; seed without preparation.

PEPPERELL.—Claimants, 15. Acres sown, $26\frac{1}{4}$. Product, $428\frac{1}{4}$ bush.

Average per acre, 16 bush.

Largest crops, 28 bs.; three of 20 bs.; two of 18 bs.; two of 15 bush. per acre.

REMARKS. Largest crop with 20 bs. of ashes and 200 lbs. Gypsum; suffered much from drought. One crop of 20 bs. on $1\frac{1}{2}$ acres, with 15 loads of green manure. One crop of 20 bs. on 1 acre, with 2 hhds. of lime. A case in which the seed was much smutted but before sowing soaked 18 hours in salt brine; the crop, healthy and fair. In one case in the same field, "the Black Sea wheat was plump; the bald blighted."

READING.—Claimant, 1. Acres sown, 2. Product, 28 bush.

Average per acre, 14 bush.

REMARKS.  The crop here to which a premium was paid, was "Indian wheat," that is, Tartarian Buck wheat.

SHERBURNE.—Claimants, 6. Acres sown, $15\frac{1}{2}$. Product, $159\frac{1}{2}$ bush.

Average per acre, $10\frac{1}{3}$ bush.

Crops, 16 bs.; $13\frac{1}{2}$ bs.; 12 2-5 bs.; 12 bush. per acre.

REMARKS. In three cases 6, 8, and 12 loads of unfermented manure applied; wheat suffered from rust. One sandy loam with five hhds. of lime per acre; the produce 8 bs. In one case half the wheat was winter-killed.

SHIRLEY.—Claimants, 13. Acres sown, 27. Product, $369\frac{1}{2}$ bush.

Average per acre, 13 18-27 bush.

Largest crops, 20 bs.; two of 18 bs.; one of $16\frac{1}{4}$ bs.; $15\frac{1}{2}$ bs. per acre.

REMARKS. Crop of 20 bs. land highly manured for previous crop. The crop of 18 bs. on land the previous year manured with 30 loads to the acre of good manure; and the year of the wheat crop with 6 bs. of lime and one of salt. No accident nor injuries. A "strong yellow soil."

STOW.—Claimants, 19. Acres sown, 27½. Product, 398½ bush.
Average per acre, 14 18-27 bush.
Largest crops, four of 20 bs.; one of 19½ bs.; two of 19 bs.;
two of 18 bs. per acre.

REMARKS. Crop of 20 bs. manured with 25 loads of green manure and
5 bs. of lime. One crop of 19 bs. with 20 loads of green manure. One
crop of 19 bs. with ten loads of green manure. One case of grain worm.
One of smut; seed rolled in lime, but not steeped.

TEWKSBURY.—Claimant, 1. Acres sown, 1¼. Product, 24 bush.
Average per acre, 19¼ bush.
Crop, 19¼ bush.

REMARKS. No manure; soil, gravelly loam.

TOWNSEND.—Claimants, 12. Acres sown, 25 19-32. Product, 235½ bs.
Average per acre, 9 1-6 bush.
Largest crops, 16¾ bs.; two of 16 bs.; two of 14 bs.; one
of 11 1-7 bush. per acre.

REMARKS. Crops highly manured; suffered universally from drought.
With 12 bs. ashes per acre; the crop 11 1-7 bs.

TYNGSBORO'.—Claimants, 5. Acres sown, 7 1-12. Product, 110½ bush.
Average per acre, 15 5-7 bush.
Largest crops, 20 bs.; 18½ bs.; 17¼ bs.; 13 3-5 bush. per
acre.

REMARKS. On largest crop 1 cask of lime sown in June. On crop of
18½ bs. one third loss on account of lodging early.

WATERTOWN.—Claimants, 2. Acres sown, 3¼. Product, 59 bush.
Average per acre, 16 bush.
Crops, 20¼ bs.; one 16½ bush. per acre.

REMARKS. Crop of 20¼ bs. on a dark loam with 150 bs. of soapboiler's
waste. Crop of 16½ bs. with 20 bs. bone manure; soil, dark loam. Seed—
Black Sea wheat.

WAYLAND.—Claimants, 3. Acres sown, 5¾. Product, 77¼ bush.
Average per acre, 13 bush.
Crops, 15¼ bs.; 13¼ bs.; 13 bush. per acre.

REMARKS. Crop of 15¼ bs. no manure. Other crops largely with green
manure.

WESTFORD.—Claimants, 4. Acres sown, 7¼. Product, 98 bush.
Average per acre, 12 4-7 bush.
Crops, 16½ bs.; 14¾ bs.; 14½ bs.; 12½ bush. per acre.

REMARKS. Two applications of lime in small quantities without effect.

COUNTY OF ESSEX.

BOXFORD.—Claimant, 1. Acres sown, $3\frac{1}{2}$. Product, 44 bushels.

Average per acre, 12 4-7 bs.

Crop, 15 bs. per acre.

REMARKS. Half the crop destroyed by the grain insect. Seed, Black Sea variety. Sowed April 15th.

GEORGETOWN.—Claimants, 2. Acres sown, $2\frac{1}{2}$. Product, 33 bs.

Average per acre, 13 1-5 bs.

Crops, 15 bs. ; 12 bs. per acre.

REMARKS. $1\frac{1}{2}$ cask of lime applied to an acre on crop of 15 bushels. On second crop, three cords barn manure.

HAVERHILL.—Claimants, 14. Acres sown, 22 1-20. Product, 394 bs.

Average per acre, $17\frac{1}{2}$ bs.

Crops, 24 bs. ; 21 bs. ; 20 bs. two of 19 bs. per acre.

REMARKS. Largest crop in clay and loam. 20 bushels lime and ashes mixed, applied upon $1\frac{1}{4}$ acre. Seed, Black Sea variety. Crop of 21 bushels without manure, dark yellow loam. Crop of 20 bushels, 5 cords of stable dung, and $7\frac{1}{2}$ bushels of ashes. With two exceptions, crops suffered from drought and grain insect.

METHUEN.—Claimants, 3. Acres sown, 3. Product, $48\frac{1}{2}$ bushels.

Average per acre, 16 bs.

Crops, 20 bs. ; $16\frac{1}{2}$ bs. ; $12\frac{1}{2}$ bs. per acre.

REMARKS. Largest crop, without preparation of seed or land, on a loamy soil. One case of grain insect.

NEWBURY.—Claimants, 14. Acres sown, 35 7-24. Product, 390 bs.

Average per acre, 10 6-7 bs.

Crops, $15\frac{1}{2}$ bs. ; two of 13 bs. ; three of 12 bs. ; one of $10\frac{3}{4}$ bs. per acre.

REMARKS. In largest crop, 16 bushels leached ashes applied. Three loads of ashes and 9 casks of lime applied to a sandy soil of 4 acres. The yield was $12\frac{1}{2}$ bushels per acre. In one case, 5 loads of coal ashes, (by this I understand hard coal,) applied upon a dark loam, of $1\frac{3}{4}$ acres, yield $11\frac{1}{2}$ bushels. Only one crop escaped the grain insect and drought ; and "the farmers are of opinion, that by these causes their crops were diminished from one fourth to one half."

ROWLEY.—Claimants, 3. Acres sown, $5\frac{3}{4}$. Product, $56\frac{1}{2}$ bushels.

Average per acre, 10 bs.

Crops, 11 bs. ; $10\frac{1}{2}$ bs. ; 8 26-32 bs. per acre.

REMARKS. Largest crop, on a sand soil, with five cords of compost, one cask of lime, and ten bushels of ashes. Other crops well manured. In a case where red wheat soaked in brine, and tea wheat in a dry state were sown, the tea wheat injured by smut, the red wheat good.

WEST NEWBURY.—Claimants, 15. Ac. sown, 40 93-160. Pro. 422 $\frac{3}{4}$ bs.

Average per acre, 10 3-10 bs.

Crops, 16 $\frac{1}{2}$ bs. ; 15 bs. ; 14 $\frac{1}{4}$ bs. ; 14 bs. per acre.

REMARKS. Largest crop on a gravelly loam, with 4 cords of muck and 2 $\frac{1}{2}$ casks of lime upon 1 $\frac{1}{4}$ acre. One half the crop destroyed by grain insect. The grain insect was observed to make his appearance about the middle of July. The Black Sea and the tea wheat, planted in the same field, on the 20th of April ; the Black Sea yielded 16 bushels per acre, the tea wheat less than two bushels. The crops in this town, without exception, injured severely by grain insect or drought. West Newbury, one of the most favorable locations in the State for the production of wheat, and for years an article of export from the town, to small extent. Soil, a deep, rich loam inclining to clay ; the cultivation of the town highly improved. Loss by grain insect might have been prevented, had remedies been taken in season.

COUNTY OF NORFOLK.

BELLINGHAM.—Claimants, 4. Acres sown, 4 15-16. Product, 74 $\frac{1}{2}$ bush.

Average, per acre, 15 bs.

Crops 21 bs. ; two of 14 bs. per acre.

REMARKS. Largest crops with 18 loads of green barn manure. One case of smut ; seed wet and rolled in lime.

BROOKLINE.—Claimants, 2. Acres sown, 4. Product, 70 $\frac{1}{2}$ bushels.

Average, per acre, 17 $\frac{1}{2}$ bs.

Crops, 18 bs. ; 16 $\frac{1}{2}$ bs. per acre.

REMARKS. Largest crop with one cord of loam and five casks of lime on three acres.

DORCHESTER.—Claimant, 1. Acres sown, 1. Product, 17 bushels.

Average, per acre, 17 bs.

REMARKS. With barn manure, injured by rust.

DOVER.—Claimant, 1. Acres sown, 1 $\frac{1}{4}$. Product, 22 bushels.

Average, per acre, 17 3-5 bs.

REMARKS. Manured with barn manure.

FOXBORO'.—Claimants, 2. Acres sown, 5. Product, 45 bushels.

Average, per acre, 9 bs.

Crops, 10 bs. ; 8 bs. per acre.

FRANKLIN.—Claimants, 12. Acres sown, 22 $\frac{1}{4}$. Product, 293 bushels.
Average, per acre, 12 19-22 bs.

Crops, 20 bs. ; 13 bs. ; 12 $\frac{1}{2}$ bs. ; eight of 12 bs. per acre.

REMARKS. Crop of 20 bushels, with 28 loads of green manure, and one bushel of lime on three acres. No disease nor accident.

MEDFIELD.—Claimants, 6. Acres sown, 10 $\frac{1}{2}$. Product, 151 bushels.
Average, per acre, 14 2-5 bs.

Crops, 24 bs. ; 17 bs. ; 15 $\frac{1}{2}$ bs. ; 13 $\frac{3}{4}$ bs. per acre.

REMARKS. In one case, on two pieces growing side by side, one manured with ten loads of green barn manure per acre, and the other with eight loads of rotten compost to the half acre, the latter gave at the rate of 24 bushels per acre ; the former, at the rate of 13 $\frac{3}{4}$ bushels per acre. Soil, in former case, was a "yellow loam ;" in the latter, "green sward."

MEDWAY.—Claimants, 8. Acres sown, 11 $\frac{1}{4}$. Product, 147 bushels.
Average, per acre, 12 $\frac{1}{2}$ bs.

Largest crops, 20 bs. ; 19 bs. ; three of 18 bs. ; one of 13 $\frac{1}{2}$ bs. per acre.

REMARKS. Crop of 20 bushels with seven bushels of ashes, and four casks of lime per acre. Crop of 19 bushels with 12 loads of green manure, and one cask of lime. Crops of 18 bushels with 15 and 16 loads of green winter manure. The seed steeped in lime water 36 hours, and "part of it never sprouted."

NEEDHAM.—Claimants, 5. Acres sown, 11 4-10. Product, 92 $\frac{3}{4}$ bushels.
Average, per acre, 8 2-11 bs.

Crops, 14 bs. ; 11 $\frac{3}{4}$ bs. ; 8 bs. per acre.

REMARKS. Crop of 14 bushels with ten cart loads per acre of barn manure.

RANDOLPH.—Claimants, 3. Acres sown, 4. Product, 53 bushels.
Average, per acre, 13 $\frac{1}{4}$ bs.

Crops, 18 bs. ; 16 bs. per acre.

REMARKS. Largest crop without manure. In one case, two casks of lime and 15 bushels of ashes put on two acres, after the wheat was sown ; yield, 9 $\frac{1}{2}$ bushels per acre.

ROXBURY.—Claimant, 1. Acres sown, 3. Product, 39 bushels.
Average, per acre, 13 bs.

REMARKS. Soil light ; the land in previous season in potatoes ; suffered by drought.

WALPOLE.—Claimants, 21. Acres sown, 39 $\frac{1}{4}$. Product, 450 $\frac{1}{2}$ bushels.
Average, per acre, 11 $\frac{1}{2}$ bs.
Largest crops, 18 bs.; 16 bs.; 14 $\frac{3}{4}$ bs.; two of 14 $\frac{1}{2}$ bs. per acre.

REMARKS. With 12 casks of lime to 2 $\frac{1}{2}$ acres; yield 12 $\frac{3}{4}$ bushels.

WEYMOUTH.—Claimant, 1. Acres sown, 1 $\frac{1}{4}$. Product, 16 bushels.
Average, per acre, 12 4-5 bs.

REMARKS. Two cords of barn manure and two casks of lime applied.

WRENTHAM.—Claimants, 5. Acres sown, 8 $\frac{3}{4}$. Product, 94 $\frac{3}{4}$ bushels.
Average, per acre, 10 26-35 bs.
Crops, 15 bs.; 11 $\frac{1}{2}$ bs.; 11 bs.; 10 bs. per acre.

REMARKS.—Largest crop with yard manure, amount not stated. Seed prepared by steeping in a solution of vitriol; the crop “perfectly clean.” Crops suffered by drought.

COUNTY OF BRISTOL.

ATTLEBORO’.—Claimants, 4. Acres sown, 10 $\frac{1}{2}$. Product, 67 bs.
Average per acre, 6 4-10 bs.
Crops, 11 bs.; 6 bs.; two of 5 bs. per acre.

REMARKS. No manure; injured by drought.

BERKLEY.—Claimants, 1. Acres sown, 3. Product, 19 bushels.
Average per acre, 6 $\frac{1}{2}$ bs.
Crop, 6 $\frac{1}{2}$ bs. per acre.

REMARKS. 1 $\frac{1}{2}$ cask of lime per acre. Injured by drought.

DARTMOUTH.—Claimants, 8. Acres sown, 20 $\frac{1}{2}$. Product, 314 bs.
Average per acre, 15 3-5 bs.
Largest crops, 24 bs.; 19 bs.; 17 $\frac{1}{2}$ bs.; 16 bs. per acre.

REMARKS. Largest crop, with eight tons of “sea muck and barn manure,” and 1 $\frac{1}{4}$ barrels of lime on $\frac{1}{2}$ of an acre. One crop with 100 bushels of ashes, and ten casks of lime per acre, yield 12 bushels. Suffered from rust. With 35 tons of stable manure and “drift stuff,” (sea wreck,) crop 19 bushels.

EASTON.—Claimants, 3. Acres sown, 3 $\frac{1}{2}$. Product, 54 $\frac{1}{2}$ bushels.
Average per acre, 15 3-7 bs.
Crops, 17 3-5 bs.; 15 $\frac{3}{4}$ bs.; 13 bs. per acre.

REMARKS. Largest crop with eight loads of “tussac ashes,” (presumed the ashes from the paring of bog meadows.) Second crop had 24 one horse loads of barn and hog manure.

FAIRHAVEN.—Claimants, 6. Acres sown, 9 107-160. Product, 117 bs.

Average per acre, $12\frac{1}{2}$ bs.

Crops, two of 16 bs.; 12 bs.; two of 10 bs. per acre.

REMARKS. One crop of 16 bs. had no manure.

“ “ “ “ six tons of “fish and dirt,” on an acre.

“ “ 12 “ thirty loads of “fish and dirt” upon

2 27-160 acres. All suffered from drought.

FALL RIVER.—Claimants, 3. Acres sown, $4\frac{1}{2}$. Product, 77 bushels.

Average per acre, 8 5-9 bs.

Largest crops, two of 18 bs.; one, 17 bs. per acre.

REMARKS. First crop of 18 bushels without manure.

Second “ “ with common barn manure.

FREETOWN.—Claimants, 7. Acres sown, $16\frac{3}{4}$. Product, 138 bs.

Average per acre, $8\frac{1}{2}$ bs.

Largest crops, 16 bs.; 14 bs.; 12 bs. per acre.

REMARKS. The largest crop manured with 85 barrels of fish mixed with earth. The grain “perfect.” One case of smut; seed soaked in lime water; one, where seed was “brined and limed.” Five crops suffered from drought.

MANSFIELD.—Claimants, 2. Acres sown, $2\frac{1}{4}$. Product, $35\frac{1}{2}$ bushels.

Average per acre, $11\frac{1}{8}$ bs.

Crops, $14\frac{1}{2}$ bs.; 10 bs. per acre.

REMARK. Suffered from drought.

NEW BEDFORD.—Claimants, 7. Acres sown, $15\frac{1}{2}$. Product, 172 bs.

Average per acre, 10 12-15 bs.

Largest crop, 23 bs.; 16 1-5 bs.; 13 77-100 bs.; 12 4-10 bs. per acre.

REMARKS. Largest crop, without manure; yellow loam and gravelly soil. With $112\frac{1}{2}$ bushels of ashes, and $5\frac{1}{2}$ casks of lime upon an acre, the yield $7\frac{1}{4}$ bushels; struck with rust. Excepting above case no disease nor accident. With 20 tons stable manure, the yield $16\frac{1}{4}$ bushels.

PAWTUCKET.—Claimant, 1. Acres sown, $1\frac{1}{2}$. Product, $26\frac{1}{2}$ bs.

Average, per acre, $17\frac{1}{2}$ bs.

Crop, $17\frac{1}{2}$ bs. per acre.

REMARKS. Five and a half cords of hog manure on gravelly loam. Injured by drought.

RAYNHAM.—Claimant, 1. Acres sown, $2\frac{1}{4}$. Product, $15\frac{1}{2}$ bushels.

Average per acre, 6 8-9 bushels.

REHOBOTH.—Claimants, 4. Acres sown, 8 3-20. Product, 77½ bs.
Average per acre, 9 70-160 bs.
Crops, 10¾ bs.; 10 bs. per acre.

REMARK. Suffered severely from drought.

SOMERSET.—Claimants, 1. Acres sown, 1½. Product, 18½ bushels.
Average per acre, 12½ bs.

SWANSEY.—Claimants, 3. Acres sown, 6. Product, 74¾ bushels.
Average per acre, 12½ bs.
Crops, 15½ bs.; 11 2-5 bs. per acre.

REMARK. Suffered from drought.

WESTPORT.—Claimants, 2. Acres sown, 2½. Product, 33 bushels.
Average per acre, 13 1-5 bs.
Crops, 18 bs.; 10 bs. per acre.

REMARKS. Largest crop had 6 loads hog yard manure and 4 casks of lime. Crops suffered from drought and rust. In both cases, the best wheat on the high and dry land.

COUNTY OF PLYMOUTH.

ABINGTON.—Claimants, 9. Acres sown, 20. Product, 221 bushels.
Average per acre, 11½ bs.
Largest Crops, 26¼ bs.; 13¾ bs.; 12¾ bs.; 12½ bs. per acre.

REMARKS. Largest crop, rich loam, with 46 loads compost with lime per acre. On the same farm, 46 loads barn manure applied to 2½ acres, on a sandy soil; the yield 8¾ bushels. With 2 cords slaughter-house manure on 3 acres; product 12½ bushels per acre. No accident nor disease recorded.

BRIDGEWATER.—Claimants, 30. Acres sown, 56½. Product, 703 bs.
Average per acre, 12 5-14 bs.
Largest crops, 22 bs.; 20 bs.; 19½ bs.; 17½ bs. per acre.

REMARKS. Largest crop with 26 loads of good stable manure upon 2½ acres. With 25 loads of soil from under a barn, upon 1½ acre; yield 10¾ bushels. With 400 bushels ashes and 10 casks lime on 2½ acres; the yield 12¾ bushels. With 40 loads of compost, and 12 casks of lime upon 2 acres, yield 11½ bs. per acre.

One case of smut, seed sowed with dry lime.

“ “ “ wet and dried in unslacked lime.

“ “ “ soaked two days in water and dried in ashes.

Crops suffered by drought and grasshoppers. On gravelly clay with 10 casks of lime on 1¾ acres; the crop suffered from rust and spindle worm.

DUXBURY.—Claimants, 13. Acres sown, 19 7-12. Product, 226 bs.
Average per acre, $11\frac{2}{3}$ bs.

Largest crops, 19 bs. ; $16\frac{2}{3}$ bs. ; 16 bs. ; $15\frac{1}{4}$ bs. per acre.

REMARKS. Largest crop with 20 loads of compost. Second crop of 16 bs. with 15 loads of barn manure. With 50 loads of compost, the yield $11\frac{2}{3}$ bushels. With 45 loads of compost and eight casks of lime, the crop 16 bushels.

EAST BRIDGEWATER—Claimants, 4. Ac. sown, 7 29-40. Prod. 104 bs.
Average per acre, 13 1-7 bs.

Crops, 17 bs. ; 16 bs. ; 12 bs. ; $9\frac{3}{4}$ bs. per acre.

REMARKS. Crop of 17 bushels, with soap-boilers' waste at 175 bushels per acre ; seed, Black Sea wheat. This respectable farmer has undertaken the purchase of ashes and the manufacture of soap, that he may have advantage of the leached ashes upon his farm. The effects on his grass are very encouraging

HALIFAX.—Claimants, 3. Acres sown, 8 95-160. Product, 67 bs.
Average per acre, $7\frac{3}{4}$ bs.

Crops, $10\frac{2}{3}$ bs. ; 7 bs. per acre.

REMARKS. One crop six bushels per acre. Suffered from frost in June.

HANOVER.—Claimants, 6. Acres sown, $11\frac{1}{4}$. Product, 101 bushels.
Average per acre, 9 bs.

Crops, 14 bs. ; 10 6-7 bs. ; four of $7\frac{1}{2}$ bs. per acre.

REMARKS. Largest crop with 12 loads of compost from the yard. Crops suffered from drought.

HANSON.—Claimants, 5. Acres sown, $13\frac{3}{4}$. Product, 115 bushels.
Average per acre, $8\frac{1}{2}$ bs.

Crops, $10\frac{1}{4}$ bs. ; $8\frac{1}{2}$ bs. ; two of 8 bs. ; $7\frac{3}{4}$ bs. per acre.

REMARKS. Barn manure applied with great liberality. The crops injured by drought

KINGSTON.—Claimants, 7. Acres sown, 20. Product, 146 bushels.
Average per acre, 7 6-20 bs.

Largest crops, $10\frac{2}{3}$ bs. per acre ; 9 bs. ; 8 1-10 bs. per acre.

REMARKS. "In the crop of nine bushels per acre, twenty tons of compost manure per acre were applied on half an acre being the low land ; and three hundred bushels of leached ashes per acre on one and a half acre, being the sandy, loamy, gravelly and low land. The wheat was badly shrunk by the drought ; "that on the low land suffering most." Crops suffered severely by the drought.

MARSHFIELD.—Claimants, 7. Acres sown, 12 $\frac{1}{4}$. Product, 158 bs.
Average per acre, 12 5-6 bs.
Crops, 19 $\frac{1}{4}$ bs.; two of 16 bs.; one of 14 bs.; 12 $\frac{1}{2}$ bs.
per acre.

REMARKS. The largest crop had seven loads of barn manure and 6 bushels ashes. Crop of 14 bushels with 20 loads barn and sea manure. Crop was smutty; the seed washed in clear water. Ten tons of kelp applied in one case; yield 12 $\frac{1}{2}$ bushels.

MIDDLEBORO'.—Claimants, 64. Acres sown, 120 1-12. Product, 1441 bs.
Average per acre, 11 1-10 bs.
Largest crops, 23 bs.; 21 $\frac{3}{4}$ bs.; 21 $\frac{1}{2}$ bs.; 19 bs. per acre.

REMARKS. Largest crop on land with 40 loads of "common" manure, 2 hogsheads of lime and 4 bushels of ashes upon 1 $\frac{1}{2}$ acre.

One crop of 21 $\frac{3}{4}$ bushels with 10 loads of compost per acre.

" 21 $\frac{1}{2}$ " 14 " hog manure per acre.

Crops suffered from drought.

N. BRIDGEWATER.—Claimants, 8. Acres sown, 14 $\frac{3}{4}$. Product, 157 $\frac{3}{4}$ bs.
Average, per acre, 10 $\frac{3}{4}$ bs.
Largest crop, 23 bs.; 19 bs.; 18 $\frac{3}{4}$ bs.; 15 $\frac{1}{4}$ bs.; 13 $\frac{1}{2}$ bs. per acre.

REMARKS. Largest crop with 5 cords of compost, and 4 casks of lime, injured by drought. Crop manured with 4 cords compost, produced 9 $\frac{1}{2}$ bs. per acre. With exception of this latter crop, injured by drought.

PEMBROKE.—Claimants, 3. Acres sown, 5. Product, 52 bushels.
Average, per acre, 10 2-5 bs.
Crops, two of 11 $\frac{1}{2}$ bs.; one of 10 $\frac{1}{2}$ bs.; one of 10 $\frac{1}{2}$ bs. per acre.

REMARKS. The largest crops on land dressed the previous year with 30 loads mud compost, and one cask of lime per acre. Soil, a sandy loam. The crops injured by drought, rust, and grasshoppers.

PLYMOUTH—Claimants, 9. Acres sown, 12 43-48. Product, 204 bs.
Average, per acre, 16 1-12 bs.
Largest crops, 25 bs.; 19 $\frac{3}{4}$ bs.; two of 16 bs.; one of 15 $\frac{3}{4}$ bs. per acre.

REMARKS. Largest crop on sandy loam, with sixteen tons of barn manure. A dark loam manured the previous year with twenty tons of kelp, yield 13 $\frac{1}{2}$ bushels. With two exceptions, the crops suffered by drought.

PLYMPTON.—Claimants, 2. Acres sown, 5 $\frac{1}{4}$. Product, 41 bushels.
Average, per acre, 7 4-5 bs.
Crops, 8 bs.; 7 $\frac{3}{4}$ bs. per acre.

REMARKS. Crops suffered from an "unfavorable season." No manure applied.

ROCHESTER.—Claimants, 7. Acres sown, 12 6-20. Product, 146 bush.
Average, per acre, $11\frac{1}{2}$ bushels.

Largest crop, $20\frac{3}{4}$ bs.; 17 bs.; 14 bs.; $13\frac{1}{2}$ bs. per acre.

REMARKS. Largest crop with 2 casks of lime, 20 loads of stable manure, and five bushels of ashes upon an acre and 7 rods. Soil, a moist loam. Crop of 17 bushels with five casks of lime. With 20 loads cattle and swine manure, mixed with 20 casks lime, and 20 loads swamp mud to $2\frac{1}{2}$ acres, product, 7 bushels and 12 quarts per acre. The crops with one exception, suffered severely from drought. Lime was applied in all cases; manuring with above exception, very liberal.

SCITUATE.—Claimants, 11. Acres sown, $14\frac{1}{2}$. Product, $209\frac{1}{2}$ bushels.
Average, per acre, $14\frac{1}{4}$ bushels.

Largest crops, 19 bs.; $15\frac{3}{4}$ bs.; three of 15 bs.; one of 14 bs.; per acre.

REMARKS. The crops, with exception of three, with barn manure. No marked difference in the results. The crops with the same exceptions, had lime, but no quantities given. The reports imperfect.

W. BRIDGEWATER.—Claimants, 8. Acres sown, 10 11-24. Prod't. 153 bs.
Average, per acre, 14 1-10 bs.

Largest crops, 21 7-10 bs.; two of 16 bs.; one of 15 bs.; $13\frac{1}{2}$ bs. per acre.

REMARKS. Largest crop with 20 loads compost. With 300 bushels of leached ashes to an acre; yield 16 bushels. Crops suffered from drought. One case of smut, the seed without preparation.

COUNTY OF BARNSTABLE.

BARNSTABLE.—Claimant, 1. Acres sown, 1. Product, $15\frac{3}{4}$ bushels.
Average, per acre, $15\frac{3}{4}$ bs.

Crop, $15\frac{3}{4}$ bs.

REMARKS. Eighty loads of marsh mud compost applied.

SANDWICH.—Claimants, 10. Acres sown, 18 33-40. Product, $187\frac{1}{2}$ bs.
Average, per acre, 10 bs.

Largest crops, 20 4-10 bs.; 16 4-5 bs.; $16\frac{1}{2}$ bs.; 15 bs. per acre.

REMARKS. Largest crop with 15 loads barn manure, and 6 bushels lime per acre. On a sandy loam in two cases, 50 barrels of fish used per acre. In one, return was 8 bushels per acre; in the other, 7 1-9 bushels. One crop with 20 loads compost and 50 of swamp mud, the crop much injured by worms at the root. All suffered by drought and rust.

FALMOUTH.—Claimants, 12. Acres sown, $16\frac{1}{2}$. Product, $225\frac{1}{2}$ bushels.

Average, per acre, 13 7-16 bs.

Largest crops, 21 bs. ; 20 bs. ; 18 bs. ; 17 bs. per acre.

REMARKS. Largest crop with 12 loads barn manure. On sandy loam, stable manure applied, and 160 bushels ashes, yield 18 bushels. Sea weed and barn manure applied ; the yield 17 bushels. Eighty tons of sea weed used ; the crop injured by worms, product, 11 bs. Thirty-five tons of sea weed applied ; the yield 16 bushels.

DUKES COUNTY.

CHILMARK.—Claimants, 3. Acres sown, $4\frac{1}{2}$. Product, 55 bushels.

Average, per acre, $11\frac{1}{4}$ bs.

Crops, $13\frac{1}{2}$ bs. ; 12 1-10 bs. ; 11 bs. per acre.

REMARKS. All suffered by drought.

EDGARTOWN.—Claimants, 2. Acres sown, $4\frac{1}{2}$. Product, 55 bushels.

Average, per acre, 12 1-5 bs.

Crops, 13 bs. ; 11 bs. per acre.

REMARKS. The largest crop with 52 bushels ashes per acre. The other crop with 12 loads hog manure per acre. Seed of one crop, without preparation ; blighted.

TISBURY.—Claimants, 4. Acres sown, $6\frac{1}{2}$. Product, 78 bushels.

Average, per acre, 12 bs.

Largest crops, 15 bs. ; two of 12 bs. per acre.

REMARKS. Largest crop with five barrels of ashes.

COUNTY OF NANTUCKET.

NANTUCKET.—Claimants, 5. Acres sown, $15\frac{1}{2}$. Product, 160 bushels.

Average, per acre, $10\frac{2}{3}$ bs.

Largest crops, 29 bs. ; 19 bs. ; 12 bs. per acre.

REMARKS. Largest crop with 60 common cart loads (one horse cart presumed,) stable manure per acre. One crop with 50 cart loads stable manure and four casks of lime ; yield 19 bushels.

COUNTY OF SUFFOLK.

SUFFOLK.—Claimant, 1. Acres not given. Product, 35 bushels.

NUMBER OF ACRES AND AVERAGE YIELD OF WHEAT,
RAISED IN THE RESPECTIVE COUNTIES.

COUNTIES.						Acres sown.	Average per acre.
BERKSHIRE,	-	-	-	-	-	1569 3-5	14 2-5 bushels.
FRANKLIN,	-	-	-	-	-	860 $\frac{1}{2}$	15 $\frac{1}{2}$ "
HAMPSHIRE,	-	-	-	-	-	1065 1-20	14 1-40 "
HAMPDEN,	-	-	-	-	-	450 1-2	13 $\frac{1}{2}$ "
WORCESTER,	-	-	-	-	-	1696 7-20	15 6-7 "
MIDDLESEX,	-	-	-	-	-	437 7-20	13 1-2 "
ESSEX,	-	-	-	-	-	109	12 $\frac{1}{2}$ "
NORFOLK,	-	-	-	-	-	126 3-5	12 2-5 "
BRISTOL,	-	-	-	-	-	103 $\frac{1}{2}$	11 1-5 "
PLYMOUTH,	-	-	-	-	-	366 $\frac{1}{2}$	11 3-5 "
BARNSTABLE,	-	-	-	-	-	35 19-20	11 32-35 "
DUKES,	-	-	-	-	-	15 1-2	11 1-5 "
NANTUCKET,	-	-	-	-	-	15 $\frac{1}{2}$	10 1-5 "
SUFFOLK,	-	-	-	-	-	No. of acres not given.	Amount raised 35 bushels.

SUMMARY.

Whole number of Acres sown—Suffolk not included, - - - - - 6850

COUNTIES.						No. bushels produced.	No. of Claimants.
BERKSHIRE,	-	-	-	-	-	27,784 $\frac{1}{2}$	646
FRANKLIN,	-	-	-	-	-	13,501 $\frac{1}{2}$	519
HAMPSHIRE,	-	-	-	-	-	15,035	522
HAMPDEN,	-	-	-	-	-	6691 $\frac{1}{2}$	198
WORCESTER,	-	-	-	-	-	28,008 $\frac{3}{8}$	1099
MIDDLESEX,	-	-	-	-	-	5963	247
ESSEX,	-	-	-	-	-	1388	52
NORFOLK,	-	-	-	-	-	1474 $\frac{1}{2}$	72
BRISTOL,	-	-	-	-	-	1233 $\frac{3}{4}$	53
PLYMOUTH,	-	-	-	-	-	4245 $\frac{3}{8}$	196
BARNSTABLE,	-	-	-	-	-	428 $\frac{3}{4}$	23
DUKES,	-	-	-	-	-	188	9
NANTUCKET,	-	-	-	-	-	160	5
SUFFOLK,	-	-	-	-	-	35	1
						108,570 $\frac{3}{8}$	3642

From the above are to be subtracted, in Stockbridge, 17 $\frac{1}{2}$ bushels:—In Reading, 28 bushels of Buck Wheat.—Total, 45 $\frac{1}{2}$ bushels.

ERRATA—on page 28—1st line—for 39 $\frac{1}{2}$ read 39.

“ “ 24th “ “ 2587 “ 258 $\frac{1}{2}$

REPORT

ON THE

CULTURE OF WHEAT

IN MASSACHUSETTS, 1838.

THE Senate, by their order of 20 March, 1839, having required of the Commissioner of Agricultural Survey, an examination of all the wheat returns made to the Government, with a view to obtain the bounty offered by the law of 1838, and with reference to any improvements which the culture of wheat in the Commonwealth may admit of, the Commissioner has devoted much time to that subject; and herewith respectfully submits his report—in the preceding analysis of the returns of all the towns, and in the subjoined general remarks on the whole subject.

The number of individual claimants, whose returns have been examined, have exceeded three thousand six hundred. The amount of bushels of wheat, upon which a bounty has been paid, is more than one hundred and eight thousand. The sum paid for this object by the State in the first year of the law, is \$9,280 14 cts.

The objects of the law, proposing a bounty upon the raising of wheat in the Commonwealth, it is presumed, were two fold; the first, to ascertain the capacities of the State to produce this crop; the second, to learn the common modes of cultivating it, that if possible they might thence determine the best mode. It was therefore required, that claimants should report not only the number of bushels raised, but also the extent of land sown;

the average yield per acre ; the quantity of seed sown to an acre ; the kind of wheat sown ; the time of sowing ; the nature of the soil ; the amounts and kinds of manure applied ; the use of lime, gypsum, or ashes ; and any disease or accident by which the crop was affected. For this purpose, prepared blanks were furnished to the several towns by the Secretary of State, and the returns made, with as much exactness as was to be expected.

From these returns, it appears, that the crops suffered almost every where from drought. The season in this respect was singularly unfavorable ; the summer having been one of the hottest summers upon record, and the drought severe, long-continued, and universal. It appears, likewise, that the crop suffered severely from the grain insect or wheat fly—a scourge which until recently was not known in this State ; but which seems to have widely extended his devastations. There were also many instances of smut ; and of blight from unknown causes.

It appears, also, from the returns, that there is scarcely an instance named in which the use of lime or plaster has given any decisive and well authenticated favorable results. Wood ashes have been frequently used, and large crops have followed. Many cases, however, are reported in which their application also seems to have been without advantage. Large crops are returned where no manure whatever is reported to have been applied in the season of the wheat or the preceding season. No exact average of the amount of crops can be formed. I have carefully collated all the returns, and have obtained an average yield of each town and likewise of each county, dividing the number of bushels produced by the number of acres sown. This, however, will not give a just comparative result, as the result must be varied by the number of crops or number of acres sown. For example, in a town where two acres were sown, giving one 30 bushels and the other 15 bushels, the average would be called 23 bushels ; but in another town, presenting four claimants of an acre each, one producing 30 bush-

els and three producing 16 each, the average of the town would be stated at 19 bushels only per acre. An approximation to exactness is, therefore, all which is to be looked for in the case. The average yield per acre through the State, may be set down as about fifteen bushels.

The bounty granted by the State has not been without its use. Advantages are likely to accrue from it, which will ultimately prove more than an equivalent for the expenditure. Public attention has been particularly called to the cultivation of wheat—a product of general and necessary use; and one of the most valuable crops which can engage the attention of farmers. Though to a certain extent the crop of this year may be considered a failure, yet this fact will itself awaken intelligent inquiry into the causes of failure; and, it is hoped, in the end, lead to its successful cultivation. There are few parts of the State where it cannot be cultivated; but, if we look for a profitable return, it must be under a different course of husbandry from that now pursued. It is my firm conviction, that there is indeed, allowing always for some particular local exceptions, nothing in the soil, or climate, or agricultural condition of Massachusetts, which forbids its extensive and profitable production. I shall ask leave, under the order of the Legislature, and as Commissioner for the agricultural survey of the State, to submit my views on this subject at some length.

The importance of the wheat crop to Massachusetts is very great. It is not necessary to go into any statistical returns of the number of pounds or barrels of wheat or wheat flour, which are brought from abroad and annually consumed in the State. Every one must perceive, that the amount is enormous, since the consumption is universal, and the quantity produced in the State can do little towards supplying the demand.* Public manners in this matter have undergone a considerable change within the last quarter of a century. Bread made of rye and Indian meal, was then always to be found upon the tables in the country; and, in parts of the State, was almost

* Appendix A.

exclusively used. Wheat flour was then comparatively a luxury. Now brown bread, as it is termed, is almost banished from use. No farmer gets along without his superfine flour, his bolted wheat; and the poorest family are not satisfied, and will not be satisfied, without their wheat or flour bread. This general change in the habits of the people was nearly contemporaneous with the completion of the great Western Canal in New York, by which the abundant products of those rich wheat districts of country, which the canal opened, became accessible; and the supplies of their finest wheat and wheaten flour were brought directly to our doors, and carried, at the expense of a heavy freight, into every part of the interior of New England, even to distances of more than a hundred miles from the sea shore. The brands of the Rochester mills are almost as familiarly known on the upper waters of the Connecticut as on the Hudson; and are found as constantly in the gorge of the White Mountains and the valleys of Vermont as in the stores of New York and Albany. Indeed, wheat flour has become among us as much an article of first necessity as meat and clothing, and therefore, on grounds of sound political economy, it is matter of the highest consideration to supply, if practicable, our own wants.

This position has been strongly controverted. It has been maintained, that instead of attempting to raise wheat, it would be better to apply ourselves to some branch of mechanical or manufacturing industry, which would give us the means of purchasing our bread from countries whose climate and soil are more congenial than our own to its production. There is some plausibility and a measure of truth in this position; but it cannot be admitted without material qualifications. The true prosperity either of an individual, a family, or a larger community, is not to be measured by any standard of dollars and cents. We know to what a great extent an opposite opinion has prevailed among us, and how disastrous its influence has proved upon our habits and morals. Severe experience, it is hoped, will disabuse us of this error; and we shall presently come

to understand truths long since established, and which are of the highest practical moment, that the money which is not industriously earnt is seldom wisely expended; and that the real prosperity of individuals and nations, is not in the accumulation of mere wealth, but in those habits of industry, frugality and self-dependence, which spring from the necessity of labor and enterprise; and such a struggle with obstacles and difficulties as will awaken, and strengthen, and expand all our physical and intellectual energies. Temperance and frugality likewise lie at the foundation of all substantial prosperity; and neither the happiness nor the morals of men are safe, but where there exists an imperious necessity for the exercise of these virtues. Under such circumstances, it is clearly a principle of cardinal importance in private and public economy, that individuals and communities should, as far as possible, depend upon themselves for the supply of their own wants; should seldom go abroad for that which they can produce without loss at home; and in respect to matters of primary necessity, should endeavor, though it might seem at first to be attended with a pecuniary loss, to create resources within themselves rather than live in habits of dependence on others.

If we look at families, we shall find that those are in truth most prosperous, who rely most upon their own exertions, enterprise, and skill. While it often happens, that persons possessed of large estates, which have come to them by inheritance, accident, or some fortunate speculation, and who, because they have never known the necessity, have never formed the habits of labor, in the inevitable vicissitudes of human affairs, are wrecked and reduced to a condition of dependence and beggary, the former have known neither want nor fear. Rich in habits of labor, temperance, and frugality, of which, without their consent, no one can deprive them, they have rode out in safety the severest storms.

These principles, though they may seem remote, have a direct connexion with the subject under consideration. The moral welfare of a community is always advanced by the ne-

cessity and the habits of self-dependence. As an agricultural community especially, the people should, as far as possible, produce every article of first necessity, which they require for consumption. There may be products utterly unsuited to their soil and climate. It would be folly, where it is hopeless, to contend against nature. But in all cases, and always, where there is no obstacle absolutely insurmountable to persevering labor, success is always a moral gain.

In a pecuniary view, however, there can be no doubt that Massachusetts would find her account in producing her own bread from her own soil. Vast amounts of money are now sent out of the State for bread. This capital applied to the cultivation and improvement of her soil, would immensely increase its productiveness. Mechanical labor, in general, terminates in the article produced. Labor, judiciously and liberally applied to agriculture, produces not merely the immediate and particular crop which is sought after ; but has a cumulative influence in preparing the same land for other and larger products. The value of the land thus cultivated, is often doubled, quadrupled, and increased tenfold, by being thus rendered the more productive.

It must be considered likewise, that where a community depends upon exchange or barter, for the supply of its primary wants, as, for example, where it exchanges its manufactured articles, or the cash proceeds of these articles, for bread, this bread must be subjected to the charges of freight and commercial commissions, and to the support of a class of men whose whole business consists in the transfer and exchange of these commodities. Now, without derogating at all from the respectability of this class of our fellow-citizens as a class, and from the usefulness and necessity of their agency, to a certain degree, wherever trade exists ; yet it is plain that they are not a productive class ; but that their support is itself a tax upon the labor and industry of the country. In an economical view, it is therefore desirable, that they should exist in no larger numbers than is necessary to transact the indispensable trade of

the country ; and it will be acknowledged that the country has already suffered much from the fact of large and disproportionate numbers having been withdrawn from the laborious and productive classes in rural life, to engage in the unproductive pursuits of trade, far beyond what the commerce or mercantile business of the country require.

There are other considerations connected with this subject, especially in a moral aspect, upon which it seems excusable and seasonable to dwell. It may be assumed as an incontrovertible fact, that Massachusetts, throughout her whole territory, with a few inconsiderable exceptions, affords, always, to labor intelligently and skilfully applied in the cultivation of the soil, an ample reward. It is not pretended, that her soils yield as large a return in quantity as the fertile alluvions of more genial climates. I do not say that agriculture, even under the most favorable circumstances, will produce as much money as many branches of mechanical industry. I am aware that it offers none of the chances of sudden and great accumulation, which speculation and commerce sometimes, perhaps not infrequently, present. But the rewards of agricultural labor in Massachusetts are ample, in that an industrious man may obtain by skilful and active agriculture, not only a comfortable subsistence, but his gains will prove so much more than his real and reasonable wants, that in ordinary circumstances, he may early, as is constantly done, enjoy the satisfactions of a domestic connexion, have the means of healthful and innocent luxury, raise and well educate a numerous family, exercise a generous hospitality, and lay up a competent provision against the casualties of human affairs and the decline of life. All this may be done in the exercise of a good conscience, with a single pair of hands ; and with no other than the joint aid of a loving and growing household, and, in such cases, the ever sure blessing of a kind Providence. Hundreds of instances, throughout our favored Commonwealth, display these beautiful and enviable results. It is on this account, then, that agriculture deserves every encouragement which the State can give. It has likewise an in-

timate connexion with good morals, and the support and purity of our republican institutions.

Rural life in New England, where every man may be a freeholder, tends to inspire and encourage an honest pride of character, and a self-respect, which is a strong security to virtue. It is favorable to sobriety, industry, and an attachment to good order and quiet. It is exempt from those moral perils which exist in crowded villages ; which are found in the concealment practicable in populous cities ; in the indifference to the value of human life, which prevails there ; and especially in the corrupt associations and multiplied crimes and vices, which there inevitably abound. It is more favorable to the manly spirit of liberty, and to the sentiment of a moral and political equality, than where the extremes of human condition, enormous wealth and abject poverty, power and dependence, luxury and squalidness, pride and servility, are, as in cities, brought into constant and immediate connexion.

Agriculture, in the view of every sound political economist, is the foundation of national wealth. It is not easy to see how trade or foreign commerce, legitimately pursued, contribute in any way to the actual increase of the wealth of a country, unless it be in the value of the labor employed when an equivalent is obtained from a foreign country for that labor. Agriculture creates wealth ; and gathers its treasures without injury or diminution, from the exhaustless bounty of the Divine Providence in the earth and air. Every agricultural production is therefore a direct creation of so much additional wealth. This, however, is not all. It is not, as in manufactures, the mere using up of the raw material ; but under good cultivation, the soil itself is put in a condition to become more productive. The land is raised in value, in proportion to the increased income, which can be obtained from it. Labor thus applied, may be regarded as a sure and permanent investment of a productive capital. It is known, that in many parts of the State, under a liberal and judicious husbandry, lands in a measure worthless, or valued at not more than five and ten dollars per acre, by improvements, the expense of which, the first crops

oftentimes fully repay, are made to yield an income equal to the interest on a capital of one and two hundred dollars per acre ; and to pay at the same time, the expenses of keeping them in a productive condition.

In considering the moral influences of agriculture, the consciousness of independence, resting upon the basis of a conscious ability to supply our own wants, is not to be overlooked as a sentiment in the highest degree favorable to good morals. This conviction calls out the best powers of our physical and intellectual nature. There is a rich pleasure, not unmingled with an honest pride, in eating bread raised by our own hands. There is a duty and a pleasure in encouraging domestic industry under any and every form. The supplies of the products of foreign labor, come to us too often mingled with the painful associations of oppressed, defrauded, and unrequited toil. The products of our own honest industry and free labor, are subject to none of these painful abatements. Massachusetts will find the true foundation of independence only in rendering her soil productive ; as far as possible cutting off her reliance upon foreign supplies ; and abating, or supplying from her own resources and soil, those wants, which render her dependent upon a foreign power, for that which her own soil is capable of producing.

Above all things else, she should determine with honest pride, to raise what she eats ; or else, to eat what she raises. She can produce her own wheat. On new lands there is seldom any failure, unless one, which proceeds directly from neglect ; or from atmospheric influences, which no sagacity can foresee or control, and which are peculiar to no country. To accidents of this nature, all crops are liable. Wheat in general is, in all countries, considered a less hardy plant than many others ; yet I have the settled opinion of at least six intelligent and practical farmers in the State, that, as far as their experience goes, and it has been the experience in each of these cases of nearly a quarter of a century, wheat with them is as certain as almost any crop which they cultivate. The returns will

show, even under one of the most unfavorable years which we ever have, that many crops yielded twenty and twenty-five, not a few exceeded thirty, and some rose to forty bushels per acre.

I shall now proceed to speak of the causes of failure, and of the improvements which may be made in the cultivation, by which, in my opinion, the certainty of the crop in ordinary cases may be secured, and its product vastly increased.

CAUSES OF FAILURE.—The causes of the failure of the wheat crop are various. It fails from rust, smut, mildew, blight, the wire-worm, the Hessian fly, the grain insect, drought, wetness, character of the soil, condition of the soil, improper or imperfect manuring, and sundry errors of cultivation, which I must class under a general head. I shall speak of these in detail; and then proceed to point out the improvements which are desirable in our cultivation.

RUST.—The subjects of rust, smut, mildew, and blight, have occupied greatly the attention of intelligent observers; but the true causes have as yet eluded their inquiries. Rust is a well known disorder, in which the wheat-straw or culm becomes covered with a red powder like the rust of iron; the growth of the plant is stopped, and the grain is shrivelled and imperfect. This is found to occur under two conditions. The first is in severe drought, when the plant appears to suffer from want of nourishment. There is of course no remedy for this, unless the plant should be grown like corn in drills, and at such distances that the ground could be cultivated between the drills. This is a mode not likely to be adopted; and which is scarcely practicable for wheat on any large scale.* The second

* Of course no one can think here of cultivating wheat in drills, and ploughing between it; nor is it likely that the expensive scarifiers or cultivators used in England for stirring the land between the drills of wheat will be soon introduced among us; but I may here with propriety allude to the ascertained effects of such operations, and leave the principle implied in it to be considered and applied as any farmer may think best.†

Speaking of a crop of cabbages, Mr. Curwen says—"In the first week in June, the ploughs were set at work. As they started, Mr. — was present and saw the crop. It was with difficulty the ground was first broken; but

case in which rust appears, is where the plant seems to be excessively forced by high manuring and a peculiar state of the weather. Where the growth of the plant is very luxuriant, and there occurs a kind of weather common in July and August, half rain and half sunshine, oftentimes the sun and the rain alternately contending for possession and the heat intense, vegetation then is forced to its utmost speed, and it would seem as though the sap vessels were burst by repletion; and the exudation of the sap causes the rust which then appears upon the stalk. Against this there is no remedy known. This same disease or accident is common with herds-grass or Timothy, in time of drought, especially when the crop is thin and the ground light and scantily manured.

MILDEW.—The second disease is blight or mildew, in which the plant assumes a purple or bluish cast, resembling the mould which collects in damp places in houses upon articles of furni-

by the end of the week it was brought into fine tilth. Notwithstanding the whole week had been dry with a strong sun and a severe east wind, yet such was the progress in growth of the cabbages, that when seen again by that gentlemen on the Saturday he could scarcely be persuaded they were the same plants. During these operations, I had been making constant experiments with glasses contrived for the purpose, to ascertain the quantity of evaporation from the land, which I found to amount, on the fresh-ploughed ground, to nine hundred and fifty pounds per hour on the surface of a statute acre, while on the ground unbroken, though the glass stood repeatedly for two hours at a time, there was not the least cloud upon it which proved that no moisture then arose from the earth. The evaporation from the ploughed land was found to decrease rapidly after the first and second day, and ceased after five or six days, depending on the wind and sun. These experiments were carried on for many months. After July the evaporation decreased, which proves that though the heat of the atmosphere be equal, the air is not so dense. The evaporation, after the most abundant rains, was not advanced beyond what the earth afforded on being fresh turned up. The rapid growth of my potatoes corresponded perfectly with the previous experiments; and their growth in dry weather visibly exceeded that of other crops where the earth was not stirred. The component parts of the matter evaporated remain yet to be ascertained; the beneficial effects arising from it to vegetation cannot be doubted or denied; but whether they proceed from one or more causes, is a question of much curiosity and importance."—*Curwen's Hints*, p. 274.

ture. This is supposed by many to be on the wheat a parasitical plant or species of fungus. After this disease attacks the wheat, the leaf presently turns black ; the health of the plant is ruined, and the grain is shrivelled and worthless. This disease seems to be wholly atmospherical, or developed by the state of the air. It is produced by, or rather seems to follow excessive moisture or heavy dews, which collect and remain on the plant. It is most likely to occur to wheat growing in confined places, where the air has not a free circulation. The only remedy which has come within my knowledge, has been the sweeping of the field with a rope in the morning, when it is wet, and thus brushing off the wetness. This method is not unknown abroad ; and is stated in my first report to have been successfully practised by a careful farmer in Essex County. By these means he has saved his wheat, when that of his neighbor was destroyed. Undoubtedly the best preventive, which could be adopted against this injury, would be the sowing of wheat in high situations where it might have the advantages of a free circulation of air.

SMUT.—Another disease to which wheat is subject is smut. This is of two kinds. I shall enter into no minute examination of its character ; nor into the conflicting opinions of many profound scientific observers as to its true nature. This the most critical observations have not yet fully determined. I shall deal only with its obvious and familiar appearances, and with remedies which experiment has found effectual.

The first kind of smut is often seen soon after the wheat has begun to form its grain in single heads scattered over the field. This gives no alarm to an experienced farmer. He regards it rather as an indication of the luxuriance of his crop. The heads of the affected plants soon entirely disappear, and leave nothing but the naked culm. It is seldom that a field is so extensively affected in this way, as in any considerable measure to diminish the crop.

The second kind of smut infects the ear with a black dust, and spreads itself throughout the field. The grain is not destroyed

by it ; but the seed is covered with this black and offensive powder, and produces an impure, discolored and unhealthy flour. It can be to a degree removed from the grain by washing it after it is threshed ; but this is an inconvenient and troublesome process, and not altogether effectual. This disease, as well as smut and mildew, has been attributed to the attacks of insects or animalcules ; but late discoveries strongly lead to the belief that it is a species of fungus, the seeds of which become attached to the seeds of wheat, and are carried by some unknown process into the heads of the wheat, where they perfect themselves.

Against this accident or disease, there is a preventive which may almost be pronounced certain. The seed is to be soaked in strong brine, or in stale urine, and, while wet, sprinkled with finely slacked lime, and left in this state twenty-four hours before sowing. It is stated that its germinating power will be injured if it lays too long in urine ; but this is not the case with brine, unless the temperature of the weather is very warm. Others recommend a solution of copperas or arsenic ; but salt brine being a more simple preparation, and easily accessible to every farmer, is to be preferred. This application seldom fails to be an effectual preventive of smut. There are indeed, as will be seen, some few cases of smut stated in the reports in which the wheat is represented as having been brined and limed ; but more exact statements are wanted, before we distrust the efficacy of this preventive, which has been established by numerous experiments of the most decisive character. Persons often question the rule, when the experiments, which they make, are too imperfect to test it. For example, they will brine the seed without liming it ; or they will merely wet the seed in pure water and apply lime to it ; or they will soak it in brine and apply ashes or gypsum to it. None of these modes are a security against smut. But where the seed is thoroughly steeped in strong brine, sprinkled with caustic or quick lime, and allowed to remain some hours after being thus dressed, and not suffered to become dry before it is sowed, the preventive,

though it may not be absolutely infallible, may be relied upon with almost entire confidence.

That the two kinds of smut are different in their nature, is evident from a well established fact. An attempt to communicate the disease to other plants of wheat, by sprinkling the powder of some of the first kind of smut upon them, was not successful. But the application of the powder of the latter kind of smut referred to, has, in repeated trials, proved infectious.

There are other diseases to which wheat is subject, which may be only different aspects of those to which I have alluded ; or which arise from causes not well ascertained. Natural science has done something in the investigation of their nature ; but as yet, amidst the conflicting theories and conjectures which have been started, there is little solid ground to rest upon.

INSECTS.—WIRE WORM.—Wheat, besides being subject to various diseases, has enemies to contend with among the insect tribes, which are formidable and often destructive. The wire-worm is well known to farmers ; and several cases of injury from his ravages are mentioned in the reports. These are principally found in lands, which have been some time in grass and newly broken up. On this account where they abound, to sow wheat on green-sward ploughed up, would not be advisable. A farmer in Williamstown, whose land was much infested with these worms, and whose corn crop always suffered severely from them when it was planted upon grass land newly broken up, found great advantages in ploughing his land in the fall, by which operation he thought many worms were destroyed by the frost ; and then taking a crop of oats, which they were not likely to injure, before he took any other crop. This was followed by corn, and then by wheat. They are not disposed to stay in cultivated land, but prefer that which is in grass. Another farmer in Templeton, whose statements seemed entitled to confidence, is in the habit of putting some salt in the compost heap, with which he manured his corn.

He says in this way his corn has escaped the depredations of the wire-worm, while his neighbor's corn over the fence, would suffer severely. He has been accustomed to do this for several years, but could give me no definite rule as to the proportion of salt used in the heap. As well as I could gather from his statements, however, it was not large. To all soft-skinned worms, such as slugs, &c., the application of caustic or quick lime, if a small amount comes in contact with them, will prove destructive; but this does not seem to be the case with those which are encased in an armor of horn. The application of lime, therefore, in the hill with corn, is not found a preventive against the injury from the wire worm.

E. Phinney, of Lexington, whose authority is entitled to the highest respect, "advises in the ploughing of green sward, to turn it over in the spring, say from the first to the middle of May, after the grass shall have started a few inches. The reasons are, that generally a greater quantity of vegetable matter is turned under; the sod will turn over smoother in the spring than in the autumn, the grass is much less likely to spring up between the furrow slices, which materially injures the crop; and lastly the worms which commonly abound in grass ground are less likely to injure the crop. The reason must be obvious. Finding no green substance in land turned over in the fall to feed upon, they invariably seize upon the growing crop. Where the green sward has been thus turned over in the spring, after the grass has started, it is affirmed upon experience that injury from the worm does not occur, but when this is done in autumn, it is rarely otherwise."

N. Bennet, of Framingham, thinks "turning over green sward in August, a perfect remedy for the corn or cut worm, which is the wire worm here referred to. By ploughing so early in the season, the grass has time to spring up and grow before winter between the furrows; and when he cross-ploughs in the spring, the young grass furnishes a sufficiency of food for the worms, and therefore the corn is not injured by them." Robert Colt, of Pittsfield, whose farming as well as that of

Mr. Bennett, has been honored with the premiums of the Massachusetts Agricultural Society, says "that he is satisfied from experience, years since, that the ploughing of green sward or stubble in the autumn, is a loss in the following crop of at least ten per cent. Sward lands, that are ploughed in the fall become compact during the winter; the finer parts washed between the furrow slice, excluding the air, and preventing the surplus water from draining off, consequently the turf lies heavy and dormant, with but little benefit to the crop. On the other hand, if ploughed in the spring, the soil is light and receives the harrow kindly; and the furrow slice does not become so compact as to prevent the circulation of the air, and allows the excess of water to take its proper course; and the sward, when the crop comes off, will be in a more forward state of decomposition than if ploughed the fall before."

These various opinions, coming from practical men of much intelligence and long experience, deserve attention. It would not answer to delay the sowing of wheat until the middle of May, as there would be great risk in our climate of its suffering from mildew. If wheat is to be sowed on green sward, it should be ploughed much earlier. But this would not in that case afford the protection against the wire worm to which Mr. Phinney refers. I must dissent from the inference, (at least, I hold my judgment in suspense until I have farther light,) that this late spring ploughing is to be deferred on account of the superabundance of vegetable matter then to be turned under. Theory and experiment in this matter conflict with each other. I have been always inclined to the belief, which generally prevails, and which Mr. Phinney maintains, that the higher the state of luxuriance in which vegetable matter is turned in by the plough, the more the land will be enriched by it. But the experience of one of the best farmers in the State, has satisfied me, especially as it has been confirmed by another equally intelligent farmer, and wholly unbiassed by the judgment of any other person, that the land is more benefited by the turning in of the clover crop after it is dried than when in a state

of greenness and full of sap. The opinion is, that if green it creates an acidity in the soil prejudicial to the succeeding crop. I do not know whether this theory be sound or not ; but I have seen an experiment tried with a view to this point, in two adjoining lots of ground in the same field ; and the result was conclusive in favor of turning in the crop when dried. Mr. Colt's opinion in favor of spring ploughing or against fall ploughing bears on the same point. The conclusion, which seems to follow from these premises, is against sowing wheat upon green sward, on account of the wire worm. In such case, corn or oats then should be taken as a first crop ; and corn may be taken, as Mr. Phinney advises, on a late ploughed sward, as the disadvantage, if there be any, in the comparison between turning in the herbage in a green instead of a dried state, may be more than compensated by the protection which it furnishes against the worm ; but if wheat is to be sowed, on green sward or stubble, on account of the results of Mr. Colt's experience, whether his notions be well or ill founded, it is to be advised to plough in the spring ; but then as early as possible ; because, as I am satisfied, of the expediency under all circumstances of sowing spring wheat as early as possible. In this case, the chances of the worm must be encountered, unless the mixture of salt with the compost, as mentioned above, may afford a security against him.

Hessian Fly.—The Hessian fly is another enemy from which wheat has heretofore suffered a great deal. His ravages constituted a principal reason many years since for relinquishing the cultivation of wheat in several parts of the State. This scourge was supposed to have been introduced into the country in the baggage of the German soldiers, who came as the mercenaries of the British, in the time of the American Revolution. Yet no such insect was known in the province of Hesse, from which these soldiers came.

The maggot is found between the leaf and the culm in the first joint of the plant ; and beds himself in the stalk at that place, by which it is destroyed. At his first coming in the

country, his ravages were extensive and alarming ; but his appearance is now of comparatively rare occurrence. Two broods are hatched in the course of the year. Late planting, both in respect to winter and spring wheat, seemed sometimes to carry the wheat beyond the time when from the habits of the fly, the plant was most exposed to injury, or when the fly was in a condition to inflict the injury ; but no certain protection against this destructive insect is known. In some of the reports, the wheat is stated to have been injured by the Hessian fly ; but I believe in all these cases, from some confusion of names, the grain insect is referred to.

GRAIN INSECT.—The grain insect, as he is termed, is comparatively of recent appearance. He has extended his devastations very widely over the country. The reports abound with complaints of the injuries produced by him. In the report, which I had the honor to submit to the Senate by their order on the subject of Spring Wheat, I referred to this insect ; and notwithstanding numerous cases of injury to the crops are reported, I am confirmed in the conviction, that a perfect remedy is within the reach of the farmers.

In the year 1835, I had the pleasure of submitting to the agricultural public through the columns of the *New York Farmer*, then published in the city of New York, what I believed one of the most important discoveries ever made ; and whose value must be to the country that of untold millions ; that is, an effectual security against the ravages of the grain insect. Letters received by me from the interior of New York, Saratoga, and Rensselaer counties, and from some of the most intelligent wheat growers in that part of the country, spoke of the ravages of this insect as utterly discouraging ; and expressed their serious apprehensions that the cultivation of this crop must be abandoned until the pest should be stayed. One farmer in Rensselaer county, who had sowed thirty bushels of wheat, on threshing his crop obtained seven only ; and the result with many others was similar. In a journey afterwards to the head waters of the Connecticut, and thence into the

north-easterly part of New Hampshire, I found the ravages committed by this insect most extensive ; and, in some cases, fields, which promised an abundant yield, were cut up for litter.

These facts were seriously alarming, but an observing and experienced farmer in the interior of New Hampshire, informed me, that he had in two instances, prevented the ravages of the fly, by the application of lime, as I shall presently explain. Another farmer had tried this method with success, and showed me in a field of rye a perfect demonstration of its efficacy ; the part, which had been limed, was free from the insect, while that part of the same field, to which no lime had been applied, had been severely injured by it. Soon after this publication, a distinguished friend of agriculture in New York, expressed his distrust of the efficacy of this preventive. But this was without having fully tried it, and a few months before his lamented death, he gave me to understand that his views on this subject were somewhat changed ; and that he had received so many testimonies from farmers, entitled to the highest confidence, of its efficacy, that he could not gainsay them.

The evidences, which I have received in the course of my inquiries, being the result of the experience of several trials, leave no doubt that the preventive, if not infallible, may be relied on with strong confidence. The preventive consists in giving the grain a thorough coating of newly slacked lime, just as it is coming into flower, and while it is wet with dew or rain. It may be necessary to repeat this ; but one application has proved effectual.

The fly is seen at a certain season, hovering over the field in thick multitudes. It is supposed he then deposits the germ of the maggot, which in the form of a little yellow worm, resembling a pepper-grass seed, are found afterwards in the heads of the wheat after having entirely destroyed the grain. It may not be easy to account for the operation of the lime. Whether by its caustic properties it destroys the egg, or whether it prevents the fly from alighting on the grain, or in what other way it operates, are interesting inquiries, which close observation

may presently solve. This, however, is of little moment, compared with the fact of its efficacy against this scourge.

There are other causes of the failure of the wheat crop, which the cultivator may guard against to a certain extent. Wheat is liable to suffer much from drought. Without doubt, where the early southern clover is sown with this grain, it will cover the ground, and operate, in a degree, to protect the plant from the heat of the sun. Spring wheat requires to be sown thicker than winter wheat, because it has not the same length of time to grow, and does not spread or tiller so much upon the ground. Where the crop is thin, the ground, of course, is liable to suffer more from drought than where it is thickly sown. The most successful farmers in Great Britain, seldom sow less than three, and sow often four bushels of winter wheat to the acre. The thinner the plants stand upon the ground, the more likely are they to suffer from drought. But where such heavy sowing as this takes place, the land should be in high condition.

Wheat often suffers from being lodged. This frequently happens, where the growth of the plant has been stimulated by green manures, or by weather, which gives an extraordinary impulse to vegetation. The stalk does not gain strength or stiffness in proportion to its expansion and growth, and is liable to become lodged, after which it will not ripen nor fill. Sometimes the wheat is blown down by strong winds. The only remedy I have known used in such cases, I have heretofore spoken of, where the farmer is in the habit of going into his fields, and with a rake-handle, carefully lifting the plants which are blown down. He says that in such case, a little aid given with much care, will so raise the plant that its seeds will perfectly ripen. This remedy would seem impracticable to any large extent.

Having spoken of causes and circumstances operating against the production of wheat, which may be considered as specific, and, in a popular sense, accidental, I proceed to treat of more general causes of failure. I must, however, in passing, express

my conviction that, separate from the causes to which reference has been made, wheat of the best quality, may be grown among us, with as much certainty, as any other crop cultivated, and that the prominent occasion or ground of failure, is imperfect or deficient cultivation.*

SOILS FOR WHEAT.—With respect to soils suitable for wheat, experience proves that some are more favorable to the growth of wheat than others ; but experience has equally proved, that there are few or none on which a crop cannot be obtained under proper management. It will grow luxuriantly upon a pure peat meadow, if it be perfectly drained and thoroughly cultivated and reduced to a finely comminuted state ; or it will grow upon pure sand with the application of manure, provided a sufficiency of moisture can be seasonably applied. It will grow likewise upon clays, if a due portion of animal or vegetable manure is furnished ; the soil freed from superfluous moisture ; and at the same time reduced to such fineness as to be permeable to the minute and fibrous roots of the plant. I do not mean to say, that in the cultivation of wheat, the particular kind of the soil is matter of indifference, or that the sole design of the soil is to furnish a mechanical support for the plant ; but that the growth and health of the plant more than any thing else depend on the finely divided state of the soil, so that the fibrous roots of the plant may freely extend themselves in every direction ; and upon the manure applied, by which I mean decayed organic matter, either or both vegetable or animal remains, in sufficient quantity and well distributed in the soil. Further it is especially requisite that the soil by careful cultivation, be laid open as far as possible to the reach and powerful influences of light, air, and moisture.

PHILOSOPHY OF VEGETATION.—I shall not enter deeply into the philosophy of vegetation or the nature of soils ; but it is safe to say, however mortifying to our pride to realize the conviction, that a solution of many of the mysteries of nature, in the vegetable or animal world, is as yet not even approached. Theories respecting the different operations or influences in

* Appendix C.

nature are easily framed ; but experience, confirmed by the long and repeated accumulation of facts, presents itself as our only safe guide. We advance in our speculations to a certain point, and then an impassable barrier rises before us. We eagerly grasp at explanations which have a measure of plausibility ; but if we examine them they are in truth no explanations ; and we are as far as ever from the unravelling of the problem whose solution we seek. There is a point where ignorance and philosophy are upon a level ; because the darkness is so intense that neither of them can see at all. If we ascertain, for example, that the material creation is held together, and its wonderful relations and beautiful harmonies maintained by the force of gravitation, and by a centrifugal force, which balances the power of central attraction, where this power would act with too much strength, we certainly have made great advances in knowledge and achieved an attainment of immense practical value and utility, because we apply this truth at once to most important uses. But in what this secret force consists, and how it operates, even under the laws of quantity and distance, which we understand, we are as ignorant as when born into the world ; not even a plausible conjecture can be started. So likewise when we are told that vegetation is the result of galvanic or electric influences operating upon the roots of the plant, I cannot see that any real knowledge is gained until I know what galvanism or electricity consists in. Still less, if possible, is the science of life approached. What is done when this bodily frame starts into life, and all its multiplied, wonderful and labyrinthine circulations begin their amazing round ; what is done when, at a touch, the current of life is instantly stopped, or what takes place when the moistened and swelling seed rises from the ground in the form of a beautiful plant, pours out its fragrance and matures its fruit, and then passes into decay and dissolution, no mind is acute enough or sagacious enough to discover or imagine. It is with a similar conviction of ignorance that we look upon the contradictory opinions respecting vegetable physiology ; and the confident

theories, as unsettled as they are confident, advanced respecting the peculiar nature and composition of soils, and the effects of manures.

How much science has done is wonderful ; how little she has done, or rather how much remains to be accomplished, is still more wonderful ; it is overwhelming. Mechanical chemistry has made great progress ; and in all mechanical operations and many of the arts, an immense amount of power has been gained, which is constantly applied to useful purposes. In what may properly be termed vital chemistry, she has advanced no farther than to discover the circulation of the blood, and the ascent and descent of the sap. In respect to all organic matter she is impotent. What demonstrates her ignorance is, that, while she assumes to be able to resolve every thing into its original elements, she cannot put together what she takes apart. She reduces every thing to a few simple principles ; and yet the composition of things is variously diversified, where the original elements exist in almost the same proportions. She can analyze the blood and the flesh ; she can tell the constituents of bones and of leaves. But she cannot make a drop of blood nor an atom of flesh ; nor a bone nor a bud ; nor at her pleasure throw the coloring into a single leaf. These things are not said to undervalue or discourage the efforts of science, but in order to direct the attention of farmers to facts in cultivation and vegetation, which their own observation and experience must supply. The capacity of soils for the production of particular crops can be certainly determined only by experiment. The farmer should be often making these experiments, assured that the instructions which he gathers from them will be his safest guides. Agricultural chemistry may detect mineral ingredients in soils, which are poisonous to some plants ; but there are facts which confound all her pretensions and assumptions, for she sees different plants extracting from the same soils opposite and entirely different properties, so that on the same spot and their roots intermingling, shall spring plants which are full of nourishment, and

those whose use would be fatal to animal life. Plants like animals have their instincts and aversions ; and there is a secret power, whose foot-prints are not visible to mortal observation, which controls every thing. This ordinarily places within the reach of the plant, and directs its pursuit after that peculiar nourishment, which its peculiar nature demands, and teaches it to obtain from the earth, or the air, or the light, or the rain, the particular elements which belong to it, and arrange them under such forms and modifications as constitute its proper character, and, if we may so speak, its personal identity.

It is happy for us, that it is not necessary, in order to a successful cultivation, to be able to explain these subtle mysteries of nature ; but it would be folly or infatuation to disregard actual knowledge and facts, which experience in multiplied forms and places has fully determined, whether we are able or unable to explain their causes and modes of operation.

VARIETIES OF WHEAT.—The plant of wheat, perhaps more than any other, requires careful cultivation. Its history is not known. It is classed in the family of the grasses, and is supposed to have been brought to its present condition by careful culture. This theory probably is mere assumption, as it is not unlikely that it was in the beginning a bread grain ; but without doubt careful selection and culture have multiplied the varieties and improved the quality. It is found under two forms—the flint or dark colored ; the white or thin skinned. It is sometimes found bearded or the seeds covered with long awns, and sometimes bald or without awns. Some varieties are early, and accomplish their growth in three and four months, while other kinds do not perfect their seeds under a period of eleven months. Of these varieties, it is believed, after careful observation, that the white and soft-skinned varieties succeed best in dry soils and warm climates. The red and flint varieties prefer a moist soil and a cool temperature. The downy varieties are more exposed to suffer from mildew from the circumstance of their retaining the mois-

ture longer ; but the bald varieties seem more liable to the attack of the wheat insect ; though this fact is not fully established. It appears from the reports, that in the same field one variety suffered from blight while another escaped ; but this seems to have been accidental and not attributable to any known causes. The difference in the product in flour of different varieties of wheat is very considerable, in some cases equal to at least five bushels in a hundred. This may depend somewhat upon the cultivation ; but it is well ascertained that the white varieties produce more fine flour to the same weight of grain than the red wheats.

The soil on which wheat is cultivated is not matter of indifference. As I have said, it will grow upon any soil which is not too wet, and which is reduced to a sufficient degree of fineness ; yet, beyond question, a strong and tenacious soil, which is inclined to clay, is most favorable to its growth. Experience has well established this point ; and though pure clay would be as unfavorable to the growth of wheat as pure sand, yet the best soils for wheat are those which are tenacious and unctuous, or soapy to the feel.

MANURES FOR WHEAT.—The soil for wheat cannot be too rich, by which I intend, that it cannot abound too much in vegetable matter, if it be perfectly decayed and thoroughly incorporated with the soil. The use of long, green and unfermented manures—though there are cases which seem to form exceptions—is highly unfavorable to the crop. It forces the growth of the plant too much, and renders it liable to blight and to become lodged. The land should be enriched by previous crops ; and if any manure is applied in the year of raising the wheat it should be thoroughly decomposed and mixed as evenly as possible with the soil. Fresh liquid manure of urine, has been tried on wheat ; but though it increased very much the growth of the straw, and gave it a deep green color, it was not found to fill out as well as was expected, and the wheat was not of a good quality. This is a remarkable but not unobserved fact in vegetable economy, that the luxuriance

of the growth of the straw, even where no accident occurs, does not insure the crop. The growth of the straw, and the filling or perfection of the grain, depend on different principles or conditions, not yet understood. This is a subject which deserves much investigation, but in regard to which we have nothing more certain than conjecture to rest upon.

LIME.—It is with some diffidence that I come in the next place to speak of lime in its application to the soil for wheat, because I shall be obliged to differ in opinion from gentlemen for whom I have the highest personal respect. But the object of all sound and useful philosophy is truth, and no authority whatever can rise above facts.

It appears from the returns presented, that lime has been frequently applied, but in no such form, as far as the information given extends, to lead to any decisive inferences in its favor. When lime is applied to a crop in conjunction with manure, unless comparative experiments are made under the same circumstances, by which it can be decided whether it were the lime or the manure which produced the effect, or whether it were from the combination of the lime and manure, no certain conclusion is reached. From personal inquiries made in various parts of the State and among farmers of great intelligence and observation, I have not found a single case where any direct benefit has been traced to the application of lime to the soil for wheat. I am not, however, disposed to question its utility; and while I care nothing for any purely theoretical views, I shall proceed to state what I think may be relied upon respecting it.

It has been said that calcareous matter has been exhausted from our soils by cultivation; and this is the reason why our wheat crops fail where they formerly succeeded. It is matter of reasonable inquiry whether there is much foundation for this opinion. It does not appear from any analysis of soils which has been made, that there is more pure lime existing in soils which are comparatively new, than in those which have been some time cultivated. It does not appear that even on

the rich alluvions of the western prairies, where it is said that sometimes sixty bushels of wheat are produced to an acre, that there is a larger proportion of lime in any form, than in the old soils of this vicinity. In an analysis by the geological surveyor of the State, of five specimens of the best soils of Illinois, the highest amount obtained of the carbonate of lime was 3.3 out of 100 parts. But, in Massachusetts, several soils have been found in parts of the country longest cultivated, where the amount of the carbonate of lime has been in a hundred parts as 3.—5.—5.4. No one pretends that any earth can ever assume a gaseous form ; or in truth that the nature of this earth can ever be changed, so that with whatever else it may be combined it shall cease to be lime. But if absorbed or taken up by plants, since those products are again returned to the soil, it does not appear how the original quantity should be exhausted by the growth of plants. It may have been swept away in many situations by rains, which, where lands are under cultivation, carry away large portions of the enriched mould on the surface to deposite them on meadows and alluvions below. In this case, undoubtedly, many newly cleared lands and side-hill situations have suffered a material deterioration, and the lime has passed off with other fertilizing portions of the soil. Yet it will be admitted, at the same time, that our alluvial meadows, according to the analyses given, present a less proportion of lime than many other lands.

It has been said that lime is indispensable to the production of wheat, because it is always found in the wheat plant. Of the sulphate and phosphate of lime, some portion is found in wheat, so also in rye, in Indian corn, in the haulm of potatoes, and in various other plants, especially in clover ; but these exist in either case in extremely minute quantities ; and as it respects the existence of any earthy carbonate in wheat, it is not understood to be found at all in the grain ; and in the ashes of wheat straw, it is found only in the proportion of eleven parts in a thousand.

But, in truth, there is no deficiency of lime in our soils, so

far as it may be demanded as a constituent of wheat. In some plants, as I have said—in clover, for example—lime in one combination, is found in abundance. But lime is one of the most generally diffused substances in nature. The sea abounds in it. The land abounds in it. The learned geological surveyor states that lime in some form is to be found in every soil which he has examined. We have other facts which demonstrate its universal diffusion. Our wells abound in it. The hardness of a large portion of our waters, which renders them unfit for the purpose of washing, is commonly owing to the presence of lime. The bones of all animals are composed of fifty per cent. of the phosphate of lime. The shells of birds and of domestic fowls are composed of lime. So that in truth there is no deficiency; and it seems an established principle in chemistry, that lime, in whatever combination it may be found, whether used as a carbonate, sulphate or phosphate, marl, plaster, or bone dust, acts always the same.*

It has been stated on high authority, “that a soil is incapable of producing wheat of good quality, that does not contain carbonate of lime.” This position is at least questionable; since on the farm of Wm. Adams, of Chelmsford, Middlesex county, where wheat has been successfully cultivated for many years, it appears from a chemical examination of the soil, that not a trace of lime in this form is to be found. In the report of the Geological Survey of Maine, it is stated that forty-eight bushels of wheat have been raised to an acre; but it seems that the carbonate of lime is not found in the soil on which this wheat grew; and in the form of a phosphate it was found, only in the small amount of 1.5 in 100 parts. These cases, as well established as any thing of the kind can be, seem decisive on the point of its indispensableness in our soils to the production of wheat beyond what is already found there. Of its general usefulness in many soils, though its operation is as yet only matter of conjecture, there can be no doubt.

That the amount of lime required to produce an effect upon

* See Second Report of Agriculture of Massachusetts. Appendix, p. 161.

vegetation is very minute is established by the effects produced, beyond all question, by the application of even so small an amount as half a bushel of the sulphate of lime or gypsum to an acre. It is a wonderful fact, and sufficient to confound the presumption of man in attempting to explain with confidence many of the mysteries of nature, "that in experiments made by Sir John Herschell, it was found that minute portions of calcareous matter, in some instances less than the millionth part of the whole compound, are sufficient to communicate sensible mechanical motions and definite properties to the bodies with which they are mixed."*

The deficiency of lime in the soil is not, therefore, the cause of the failure of the wheat crop among us. Proofs of this might be multiplied, if there were occasion. Yet, on the other hand, it will not be denied that the application of lime to some soils, unless the application be to a much greater excess than is likely to take place among us, produces a decided improvement. I have no theory to establish on the subject; and it cannot be denied that even with professed chemists, the particular operation of lime upon the soil is as much matter of debate and controversy, at this very time, in Scotland and in England, where it has been for many years, and most extensively applied, as any subject whatever connected with agriculture. Any solution of the mode of operation of gypsum, or the sulphate of lime, whose effects are often so astonishing, is not even approached. But I shall proceed to state some points which seem to be well established in regard to lime. It has been said that gypsum benefits vegetation by its attraction of moisture from the atmosphere. It does indeed attract moisture, but it holds it fast and does not give it out. Its effect on vegetation in this respect, therefore, must be the reverse of beneficial. It has been supposed to assist the putrefaction or decomposition of animal or vegetable substances. But this theory experiment has wholly disproved. It has been supposed to form a necessary food of plants; and some portion of it is always obtained in the

* Roget, Vol. II. p. 38.

ashes of certain plants, especially clover. This use of it, therefore, seems established. It has been maintained that it acts as a stimulus to vegetation ; but this is wholly conjectural, and in fact explains nothing. It is saying merely in other words that it promotes vegetation, for as to any direct agency in quickening the circulations of the plant in the proper sense of stimulus, this at least has not yet been detected. Its efficiency in many cases is demonstrated ; but the soils which particularly demand its use, and the manner of its application, can only be determined by actual experiment.

Lime, if applied in a quick or caustic state, and in sufficient quantities, has a tendency at once to consume all soft or putrescible matters, of an animal or vegetable nature, by combining with the acids or the water which exist in these substances ; but how next it operates to assist vegetation is not so easily determined. The woody fibre of vegetables it does not alter, or at most in a very small degree. Undoubtedly in this operation many gaseous substances are evolved, which pass off in the air without affording any aid to vegetation. To animal manure or putrescible matters, whose decomposition it is desirable should go on gradually in the soil, this application therefore is not approved. But where there is a superabundance of vegetable matter in the soil, or where there are acid plants, whose sourness it is desirable to correct, such an application will be beneficial. Quick lime, likewise, may be useful in the destruction of all soft skinned insects with which it may come in contact.

The action of effete lime or the carbonate of lime is undoubtedly very different. Quick lime, if applied to sandy soils, if water were present, would tend to combine with the sand, and form an insoluble substance like mortar. If applied to clay, its operation would be different, as it would tend to divide and reduce it to a fine state. This would be the effect of effete lime or powdered limestone ; and, for ought as yet ascertained, these mechanical effects of lime upon tenacious soils, are the principal benefits to be derived from it. The particles

becoming divided, the soil is rendered permeable to the roots of the plants, and accessible to air and moisture. What influence the plant itself exerts upon the carbonate of lime, or upon lime in any other form of combination, is not determined. The amount of any earthy matter taken up by the plant is a very small quantity ; and it is not supposed that the plant has the power of changing its nature. The carbonate of lime is a substance scarcely soluble in water, or under any common atmospheric influences ; but it can be taken into the roots or vessels of the plant only in the most minute state of division.

The whole subject, indeed, is as much open to investigation as in the beginning. Beyond a certain quantity, the application of lime is decidedly prejudicial to soils, and the farmers in the best agricultural districts of Scotland, acknowledge that their soils have been materially injured by the application of lime to their farms. There, however, it has been applied in quantities of hundreds of bushels to the acre, and much beyond any amount in which it is ever likely to be applied here.

BERKSHIRE MARLS.—The application of the Berkshire marls, which contain more than ninety per cent. of carbonate of lime, has not been attended with those beneficial effects, which were anticipated. The experiments have as yet by no means been decisive. As yet these marls have availed little, but a hope is expressed that they may hereafter prove beneficial. The application has been made to gravelly loams, where the effects could not have been expected to be so beneficial as upon clay or peat soils. In the latter case, if applied, it may be expected to assist much in producing a fine division of the soil.

This mechanical division of the soil by the application of finely powdered carbonate of lime, either after it has been comminuted by calcination, and the pure quick lime has passed into the state of a carbonate, which it will soon do after being exposed to the air, or in the condition of finely powdered limestone, is that which is chiefly to be relied upon. The carbonate of lime is scarcely soluble in water, though it is decomposed by the access of several of the vegetable acids, and by the

carbonic acid which exists in rain water ; but, as to its chemical operations, in the form either of a carbonate, sulphate or phosphate, science has not yet reached any satisfactory conclusion. She has knocked at the door, but has gained no admission ; nor even been permitted to look through the key-hole. This, however, should not discourage her importunity.

ASHES.—With respect to wood ashes, there remains no doubt of their extraordinary efficacy in promoting the growth of wheat crops. Whatever theory may be adopted, the effects are almost certain. These ashes were themselves the constituent parts of plants, and reduced to a state of extreme fineness by incineration. They may well, therefore, serve to be taken up by other plants, or may be expected to furnish some of the elements which the plants require. They likewise attract moisture from the air, and mixing with vegetable acids, it is reasonable to believe, that combining with other substances in the soil, they may prepare them likewise to become the food of plants.

The theory of their operation is of little importance compared with the facts of their efficiency. The ashes of seaweeds, what is called in Europe kelp, and in the shops the carbonate of soda, have proved of great efficiency. I am not aware that it has been used here, to any great extent ; but the accounts given of its use abroad commend it most strongly. One of the best writers known, on the subject of the wheat culture, says, “ that two or three pounds worth of it (he means pounds sterling) per acre, spread about two months before sowing time, would always more than repay itself. It attracts moisture from the atmosphere ; it materially increases the volume of the grain, and the fineness of the sample ; but does not add to the weight of the straw, though rendering it whiter and more nourishing to cattle. It causes the wheat to assume a rich, healthy appearance, and is an excellent application after a crop of potatoes or parsnips, both of which require land to be richly dressed with stable or other strong manures, and has not the effect of decomposing them, (might he not say of consuming them ?) as lime does.”

“It is also destructive to insects, and to their eggs which lie in the soil or turf. It forces the earth-worms and wire-worms from their lurking places, to come to the surface and die, particularly when laid on in a larger quantity than I have named; some farmers being in the habit of putting on double and even treble the quantity above stated; but, I believe, without having produced proportionately larger crops from inferior land; though it has been asserted that its effect is very permanent, being especially apparent on the succeeding clover crops.”*

These statements come from the very highest practical authority. Whether our farmers would think of incurring so large an expense in manuring an acre of land, as is here mentioned, is doubtful. The expediency of its application must depend altogether upon the returns obtained from it. This with us can only be settled by actual experiment. The material is easily procured, and it is hoped that trials of it, at least on a small scale, will be made.†

GREEN CROPS FOR MANURE.—I pass now to the enriching land by green crops ploughed in. No experiments of this kind are reported in the returns, but the practice has prevailed in many cases, with apparently great advantage. Several remarkable instances of its advantages have come within my own observation. Clover has been denominated the mother of wheat. In many places it is the practice to sow clover with all grain crops, to be ploughed in with the stubble, and grain has been repeated on this land with supposed advantage. Under such a husbandry, it has been thought that the land was placed in a course of improvement. Some things in this matter are settled, and therefore deserve the particular attention of farmers.

Clover ley, as it is termed, seems to be a better preparation for wheat than any other green crop. The roots of clover are abundant and furnish a large amount of vegetable matter to the soil. In the next place the tap-root of clover penetrates the soil deeply, and the ground is kept more loose and friable than

* Le Coteur.

† Appendix D.

with any other grass. Clover, indeed, never forms an imperious sward. There may be other reasons, but they are altogether matter of conjecture. If clover is to be ploughed in, however, it is advisable that it should be done after it has been killed by the frost, rather than while in a state of greenness and luxuriance. I do not undertake to assign any reason for this; but actual observation of the comparative effects of the two methods of ploughing in the crop green, or ploughing it in after being killed by the frost on the same field, has satisfied me which is to be preferred. The superior ease with which the crop turned in is covered by the plough after it has fallen, is another circumstance which recommends the practice. It is a remarkable fact, already referred to in page 64, that in a conclusion so different from the popular opinion, two highly intelligent farmers in the State, situated many miles from each other, and without any intercommunication, should have strongly coincided.* There is a strong objection to waiting for this perfect maturing of the clover crop where winter wheat is to be sown, because it would carry the time of sowing too far into the autumn; but this objection does not apply to the ploughing in of clover for spring wheat.

It is, after all, questionable whether any other crop[†] should be sown with the wheat. There can hardly be a doubt that two crops of any kind on the same land abstract from each other. With our habits of sowing not more than one and a half bushels of winter, and two of spring wheat, to an acre, it is not so objectionable to sow grass seed, as if we followed the practice of many of the English farmers and sowed three and four bushels of wheat to an acre.

ROTATION OF CROPS.—The change or rotation of crops, is a subject, which among our farmers has received little attention; but if any truth is well established in husbandry, it is that two crops of the same kind should not be allowed to perfect their seed in succession on the same land. It is well ascertained that a change even of the kind of wheat sown is preferable to no change.

* Appendix E.

The importance of a rotation of crops is explained by a recent and curious discovery in vegetation, which striking and satisfactory experiments seem to have verified. The discovery, to which I refer, is that of the celebrated botanist De Candolle, in relation to the excrementitious powers and habits of plants. Of the nutriment, which they receive and digest, they exude an inconsumable or innutritive portion by their roots. This excrementitious matter, is supposed to unfit or poison the soil for a second crop of the same kind, until it is either consumed or neutralized by cultivation. But this very matter may prove nutritious to a different kind of plants. That plants discharge by their roots an excrementitious matter of the kind referred to, careful experiments have placed beyond a doubt; and it is, in his opinion, for these reasons that one white crop should not succeed another. This matter is understood to be discharged mainly when the seed is formed; but this point is not conclusively established. It is ascertained that it takes place more by night than by day.

One consideration ought not to be lost sight of. Wheat should never follow a crop which has not been thoroughly cultivated and in the cleanest manner. For this reason it is probable that it has been found to do better after a crop of corn than after a crop of potatoes, for with but few exceptions, nothing is more slovenly among us than our cultivation of potatoes. I have seen with chagrin many crops of wheat, which otherwise might have been expected to yield abundantly, completely smothered by a profuse growth of weeds.

SELECTION OF SEED.—I come next to speak of the selection of seed wheat. More than one hundred and fifty distinct varieties have been ascertained, but the cardinal distinctions are few, and may be summed up into the flint and the thin skinned, the bearded and the bald kinds. These seem to be original distinctions; but the matter of one kind ripening in a shorter time than another is probably the effect of selection and cultivation. A spring wheat may be changed into a winter grain; and a winter grain into a spring grain, by careful selection. How much may be accomplished in this way, is well illustra-

ted by an experiment made by the Rev. Dr. Freeman, in Dorchester, some years since, who, with great care in selecting the earliest ripe for planting, actually forwarded the ripening of the common case-knife garden bean, and obtained his crop in twenty-seven days less than the season required for its maturity when he began the experiment. After repeated trials he found he could not go beyond this, and came to the conclusion therefore that he had reached the ultimate practicable limit.*

In respect to the selection of seed, nothing can be worse than the habits of our farmers. In this respect, however, two farmers in Hawley, Franklin county, have set a laudable example. By a selection of the best heads of wheat they could find in their fields, and planting these seeds by themselves, they have succeeded, after three or four years' care, in obtaining a superior variety; and have now not only enough for their own use, but to sell. They raise wheat now in abundance, and of excellent quality; all the product of the careful selection of seed wheat from superior heads, in their own fields.

Wheat differs in its season of ripening; some winter wheats being much more forward than others, and so with summer wheats; in the length of the heads; in the hardiness of the plants; in liability to disease or to blight; and to the attacks of insects; in amount of yield, some kinds being much more prolific than others; and especially in the quantity and quality of the flour yielded from the same amount of grain. In all these respects, there are cardinal differences which materially affect the value of the crop.† These differences can be ascertained only by careful trial; but where these trials cannot be made we may avail ourselves of the experiments of others, upon whose authority we can place reliance. In most cases among us seeds are very much mixed. Different kinds are found in the same parcel. It would be worth a great deal of pains to obtain a pure crop. But this can only be done by a laborious, patient and careful selection; and the cultivation of selected varieties, under such circumstances that they cannot mix, either in the flower or the seed, and the best plants of these varieties.

* Appendix F.

† Appendix G.

Nothing is more emphatically to be condemned, than the planting of imperfect or blighted seed. A deterioration in the crops must inevitably take place. The blasted wheat will germinate, but it will give an inferior yield. The plant of such wheat will come up feebly, for the wheat plant, in its first germination, is nourished by the milk placed by nature in the seed, for the early sustenance of the plant until it rises to the surface and extends its coronal roots, as they are termed, in search of food. If the seed be imperfect or shrivelled, it can yield this first and indispensable nourishment only in a very imperfect degree. Experiments in relation to this matter as stated in my former report, have shown, in the most decisive manner, that no practice can be worse than that of planting imperfect seeds. The great rule in relation to animals holds perfect in its application to vegetables. If you desire to breed the best races, you must breed only from the best animals; for defects and imperfections have always a tendency to propagate themselves, and are always in a greater or less degree transmitted.*

QUANTITY OF SEED TO AN ACRE.—With respect to the quantity of seed to an acre, it has been already remarked, that the practice of farmers, from the reports, is to sow two bushels of spring wheat, and one and a half of winter wheat, to the acre. In this case something may depend upon the condition of the ground, and the time of sowing. If the wheat is planted early, it will have more time to tiller, that is to spread its roots and throw up shoots; but I believe that in all cases where the condition of the land will admit of it, it would be better to seed our land more liberally than we are accustomed to do. The more thickly the wheat stands upon the ground, the shorter will be the culm or stalk, and the less likely is it to become lodged and broken down.†

Whether summer or winter wheat is to be preferred, is a question on which there has been not a little disagreement of opinion. Winter wheat, when it survives the winter, yields better, produces heavier grain and better flour, but the danger of

* Appendix H.

† Appendix I.

being killed by the frost has very much discouraged the cultivation of winter wheat. The returns, however, specify several abundant crops of winter wheat, and in some towns they have prevailed. I have no doubt that, were the cultivation of winter wheat, among us, as careful as it should be, it would be as safe as any crop that we raise. It would be sometimes advisable, where winter wheat has been killed in patches upon the field, to harrow the whole field in the spring and sow spring wheat in the vacancies. It is plain, however, that from such a crop as this it would not be expedient to obtain the seed of a succeeding crop.

DEPTH OF SOWING.—With respect to the depth of sowing, several things are to be considered. The seed requires air, moisture, heat, and the exclusion of light, in order to its germination. The wheat plant has two roots, the first what are called the seminal roots, which are thrown out from one end of the seed ; and there is provided in the seed the nourishment for the throwing out of these roots and the support of the stalk until it approaches the surface ; when it throws out another set of roots, denominated the coronal roots, which extend themselves laterally in search of the nourishment in the soil. If the seed be planted too deeply, it suffers for want of air and moisture, and the nourishment or milk in the seed becomes exhausted in bringing the shoot to the surface, and it comes up in a weakly state. If it is planted too shallow, the coronal roots are thrown out on top or above the ground, and often perish from drought or frost ; besides, in such case the seminal roots being too near the surface, they also suffer from exposure to atmospherical influences, and the plant is imperfectly fixed in the ground. The precise depth cannot be fixed, but these things are to be taken into consideration. If it be winter wheat, it should be sown more deeply than in the spring, as in such case the plant is less likely to be thrown out by the frosts.

It is true, that at any depth at which wheat is likely to be sown, when frozen the roots would be as likely to be broken in the one case as in another ; but if broken when sown deeply, they would be less exposed to the external frost than if planted

near the surface and consequently liable to be thrown entirely out. There is danger, however, of sowing too deeply, so that the seed is placed beyond the reach of the warmth of the sun and air, as without this warmth no healthy vegetation can take place. From two to three inches would be deep enough, if it were practicable accurately to reach that depth.

It is often a question, whether wheat should be ploughed in or simply harrowed. Where the crop is to be winter wheat, it is well, when the ground is prepared and the wheat sowed, to plough it in at right angles with the course of the prevalent winter winds. In this way, the seed will be thrown into the furrow, and when it comes up will be sheltered and protected in a degree from the cold.

Winter wheat, after the ground becomes dry, and especially if the soil is close and heavy, may be harrowed in the spring, even once or twice, to advantage. Some of the plants may be torn up by the operation; but I know, from repeated trials, that they will be many fewer than would generally be apprehended; and a most ample compensation will be found in the loosening of the ground about the others, and rendering it open to the admission of light, and air, and warmth.

With respect to spring wheat, it is greatly benefited by the fine tilth of the ground, so that it may extend its roots freely; and by the accession of the air, from which it may imbibe the oxygen, which it then particularly needs. This solves the secret of the success of the farmer in Lenox, in harrowing his spring wheat for several days in succession after it was sown and after it had germinated, and thus keeping the ground quite loose and open. A very intelligent and successful farmer in Sheffield, upon whose authority I place great reliance, says, that by this process wheat may be forwarded in its growth at least five days beyond what it would be if left untouched. This renders it a matter of much importance.

PLOUGHING FOR WHEAT.—Questions have arisen respecting the mode of ploughing for wheat; some preferring to have the furrow shut in so that the ground may be laid completely flat; and others preferring that the furrows should be laid lap-

ping upon each other. For fall ploughing and winter wheat my opinion is, that the latter method is decidedly to be preferred. If the ploughing is well done, and the ground thoroughly harrowed, there is no more evil to be apprehended from the starting of the grass, than in cases where the furrow slices are completely shut in. But it will be seen, that by this mode of ploughing a larger extent of surface is at first exposed to the influences of the atmosphere, which are unquestionably beneficial; and, in the next place, the land will lay more lightly, be less liable to suffer from wetness, which is always extremely prejudicial to winter wheat in particular; and the land in the spring may be more finely harrowed. Whether it would be equally advisable for spring grain, which it is not expedient should be planted quite as deeply as winter wheat is not so plain. In any case, however, the ground cannot be brought into too fine tilth; and, as the plant depends mainly for its nourishment upon its coronal roots, which are thrown out near the surface, it is plain that the manure, if any is applied, should likewise be kept near the surface.

TIME OF SOWING.—In respect to the time of sowing, winter wheat should be got in by the middle of September, that it may be well established before winter; and spring wheat cannot be got in too early after the ground is opened and sufficiently dry for the plough. It has been said that late sown spring wheat has escaped injury from the grain insect, when early sown wheat has been destroyed by it, the flowering season of the wheat having been coincident with its appearance. This has no doubt been the case. But the risk of mildew in late sown wheat is great; and as I conceive there is a simple and almost infallible preventive of injury from the grain insect within the reach of every good farmer, the sowing of wheat should not be delayed on that account. The chances are very many against the success of late sown spring wheat. Of the preparation of the seed, I need add nothing to what has been said in speaking of smut. Excepting for this object, it is not advisable to apply any steep; but thoroughly brining the seed and coating it with quick-lime, finely powdered before

sowing, and allowing it to remain in this condition some little time before sowing, will in general prove a certain preventive of smut.

CLEANNESS OF CULTIVATION.—With respect to cultivation, too much stress cannot be laid upon having the ground as clean as possible from weeds. In this matter we are grossly negligent. In several parts of the State, I have seen frequent cases in which a crop of wheat of luxuriant growth has been destroyed by weeds. This often comes from the use of green manure directly from the barn yard, which is surcharged with the chaff of the barn floor. The practice, therefore, of applying manure in that state, is to be strongly condemned. But unpleasant as the statement of the fact may be, it cannot be denied, that little of our cultivation is of that clean character which it ought to be; and it would be better in many cases to have a naked fallow than to plant after a crop which has been infested with weeds. It is idle to expect to be successful in our wheat crops under such circumstances. But there are various crops, susceptible of a perfectly clean cultivation, which might precede wheat without losing the use of the land by a fallow, if we will only do justice to the cultivation. In this respect, the carrot crop may be strongly recommended; for besides the clean and rich cultivation to which it is, to say the least, entitled, its tap root serves to divide the soil and reduce it to a fine tilth.

DRAINING.—Another fault in the cultivation of wheat is the neglect of draining our soils. This is done to no considerable extent among us. The least measure of superfluous moisture or what amounts to wetness, is exceedingly prejudicial to wheat. Under ground draining is scarcely practised among us; and the practice of laying our wheat land in ridges, so that the rain may immediately pass into the intervening hollows, is not at all attended to in Massachusetts. This, indeed is a poor substitute for thorough underground draining, and is attended with considerable loss of surface besides rendering the crop uneven from the accumulation of the rich mould in

the centre of the ridges. Little hope of success is to be entertained in the cultivation of winter wheat without provision against standing water upon the field ; and to spring wheat it is of almost equal importance.

DEEP CULTIVATION.—But I pass to a point more material than any other to the success of the wheat crop as the most decisive experiments in this country and abroad seem fully settled ; that is, the furnishing to the wheat crop deep cultivation, dry cultivation, and a fresh soil. The earthy constituents of the soil are, under certain qualifications, of little consequence, provided there is a sufficient tenacity to retain moisture, though not to excess, which would be positively injurious ; and provided likewise the soil be reduced to that friable and permeable state that the roots can fix and spread themselves freely, and light, and air, and moisture have free access. The beneficial agency of light upon vegetation after the germination of the seed has been completed, has been established in the most decisive manner ; and the part performed by air and moisture is too well settled to be brought into discussion. Several plants are known whose roots never touch the ground, and whose whole dependance is upon air and moisture.* A soil composed of one simple earth, whether pure clay, or sand, or chalk, is unfavorable to vegetation, though plants will live and grow in them where they are abundantly supplied with air and moisture. The intermixture seems most favorable of sand enough to render the clay permeable, and of clay enough to be tenacious of moisture. The growth of any vegetable must depend, in a great measure, upon the amount of decayed vegetable or animal matter in the soil ; and of this, undoubtedly, light, air, and moisture, are the most powerful solvents. Nothing can be taken up by the roots of the plants unless it be in a state of perfect solution, and nothing can be absorbed by the leaves or the stems of the plant unless it be in a gaseous form. The great agents of vegetation then are not the earths—though these perform their parts—but air, light, heat, and moisture

and that cultivation which renders the earth most accessible to these great agents, will beyond question prove most efficient.* I have already stated my conviction of the propriety and expediency of a rotation of crops, on the ground of the excrementitious matter ejected by a plant being unfavorable to the successive growth of the same plant or one of the same family on the same land. This, then, is also to be kept in view.

In my former report on the cultivation of spring wheat, I expressed my opinion of the necessity of deep ploughing for wheat, and the necessity of furnishing a fresh soil for its roots. This has been fully confirmed by the experiments and success of highly intelligent and practical farmers.

RECENT ENGLISH IMPROVEMENTS.—In my first report, too, I had the pleasure of laying before the government the extraordinary benefits produced by subsoil ploughing, and gave at that time a model of Smith's subsoil plough. Since that time the success which has attended this mode of cultivation, has fully confirmed all the notions and theories which I then gave on the subject; and is effecting a revolution and an improvement in the agriculture of England as extraordinary as has ever taken place in any of the arts, and which bids fair in its effects upon the agricultural welfare of the country, to rank next to the introduction of steam into the mechanic arts.

This improvement consists, in the first place, in a thorough draining of the soil by under-ground drains, which are sunk to the depth of three feet, and then filled up with loose stone to the depth of a foot; or the drain is made with tile resembling half a circle in their shape, and laid down directly at the bottom of the ditch. After this is done, the soil is ploughed and the ploughing is followed by a subsoil plough, which loosens the lower substratum without bringing much of it to the surface. At successive times more of this lower soil is mixed with the top mould, and the cultivation is constantly deepened and the ground enriched. On such soils, after careful cultivation, the crops of wheat are in many cases actually trebled, and the value of the land is vastly increased. The philosophy of its oper-

* Appendix K.

ation is understood to be, first; the perfect draining of the land, so that no superfluous moisture remains at the roots of the plant, second; the fine tilth and division of the soil, by which the roots of the plants are enabled to fix and expand themselves; third; the access of the air and light and warmth to the soils, by which simple process even the coldest and most gravelly subsoil becomes enriched and capable of sustaining and nourishing a healthy vegetation. The bringing up of the subsoil, and the intermixing of it with the surface mould, must be done gradually and not in too large quantities at once. These improvements are placed beyond all doubt. The experiments have been made for a course of years in the most conclusive and satisfactory manner. The most incredulous are convinced. Examinations have been made before committees of both houses of Parliament, and leave not a doubt on the subject.*

AGRICULTURAL IMPROVEMENTS.—There is no circumstance in the condition of Scotland or in that of Massachusetts, which would not render the same system applicable to us. Fifty bushels of wheat to an acre, weighing 62 and 64 lbs. to the bushel, are not uncommon under this system of cultivation. The proceeds of the land early defray the expenditure made in its improvement. The crop of wheat is as important to us as it is to any country. We have only to see our interest in its true light. We want only the courage to invest capital judiciously in agricultural improvements. As yet this has scarcely been done at all; but in the few cases where it has been done, even to a small extent,—the returns will be admitted to have proved as productive as in any investment whatever. The day is not distant, we express the strong hope, when Massachusetts will understand her duty and her interest; and for bread, the great and first necessary of life, will not rest satisfied under a precarious and exhausting dependence upon a foreign supply. The great objection likely to be made to the cultivation here proposed, is in the labor and expense required to render our lands thus productive. This objection may arise from timi-

* Appendix L.

dity or miscalculation, or want of calculation ; but much often-er from indolence and deficiency of enterprise, which are always barriers to the progress of any useful art, agriculture as much as any other, and to any distinguished improvement. Liberal returns can be obtained only from liberal cultivation. The traveller might, with equal reason, expect that his horse, without attention, and provender, without being carefully curried, and seasonably fed, and kindly lodged, would perform a long and laborious journey well, as the farmer to see his fields waving with luxuriant crops, and returning their golden harvest into his lap without cultivation, and cleaning, and draining, and enriching.

I should be among the last persons to recommend to the farmers any lavish expenditure of time or money in the improvement of their lands, without a prospect of remuneration. But I can say in truth, that in my various explorations in different sections of the State, I have not yet found a single well conducted instance of improvement or redemption of land, which has not given an ample return ; and in instances without number it has happened that not only has the whole expense of the improvement been repaid by the first or the two first crops, but the land itself has been increased ten fold in value, estimating its value by its prospective returns for years to come. In all enterprises of permanent improvement of the land, the simple questions to be asked are, will the enterprise or project prove effectual ? is it the best that can be undertaken ? will it remunerate the expense ? will it be profitable ? Now there is scarcely a farm in Massachusetts, where improvements may not be made, and even at a heavy expense, in which every one of these questions would not be answered emphatically in the affirmative. Many a farmer in the State, who is careful to invest his moderate earnings of a few hundred dollars in bank stock or in private notes, where, making no allowance for the various risks incidental to all such operations, the most that he can expect is a return of six per cent. interest, by a prudent and judicious investment of the same in the redemption of his

peat-bogs and low meadows, or the general improvement of his arable lands, would often obtain a return of four times that amount in their increased and improved production.

I should regret, in this case, to be misunderstood. Agricultural improvements may be divided into two classes, productive and unproductive. With respect to the latter class, such as the erection of buildings beyond the absolute needs of the farmer, and of expensive and ornamental fences, where a plainer and much cheaper erection would serve every purpose of enclosure and protection, or any work of embellishment, they are only eligible under peculiar circumstances. They may add substantially to the intrinsic value of the farm, and be strongly commended where the rights of primogeniture and entail prevailed, and the estate was likely to remain in the same family through successive generations: yet in the moderate circumstances in which most of our farmers are placed, and under the rapid changes of property, which are continually going on among us, they can hardly be advised. On the other hand, where the means are ample, we hardly know a better appropriation of money, within reasonable limits, than to the purposes of rural embellishment; or one more gratifying to a cultivated and refined mind. But with respect to improvements, which may be denominated productive, the propriety and expediency of making such, resolve themselves entirely into a question of pecuniary profit or loss. In this matter, then, the Massachusetts farmers have an important lesson to learn. They have seldom, and in very infrequent instances, regarded agriculture as a proper subject for the investment of capital; but their great object has been to keep down their agricultural expenditures to the lowest scale. There are, indeed, some honorable exceptions. In my first report,* I referred to a case of this sort, remarkable for the boldness and success of the enterprise, and especially as having been undertaken by a poor man, who had to rely upon the credit of his industry and perseverance for the

* First Report of the Agriculture of Massachusetts, p. 79.

means of accomplishing it. At that time the work was in progress. It has since been completed, and I shall subjoin in the appendix a detailed statement of its course and accomplishment.* It cannot fail to be read with great interest and instruction, as showing what great obstacles spirit and perseverance can overcome; and with what confidence, under the guidance of sound judgment, even a comparatively large amount of capital may be applied to agricultural improvements.

I am, in conclusion, satisfied, that Massachusetts is capable of producing her own bread; and of producing it to advantage. I do not say that this can be done under our present imperfect and stinted modes of cultivation. I do not pretend that it is to be accomplished without labor, and capital, and time, and skill.

Agricultural improvements usually proceed at a slow pace; and farmers are proverbially among the slowest in the community to change their habits or practices. I do not look forward to wheat being raised among us beyond our own domestic wants, although, to those, who wait a quarter of a century, such a fact may not be surprising. I do not consider the wheat plant, as upon the whole, in all its uses and results, to be placed before Indian corn. But, under good and liberal cultivation, it will be found to succeed as often as most crops. Its great value is not a matter to be questioned; and it ought to have its place in a systematic rotation of crops. Indian corn, indeed, has proved an excellent crop to precede wheat; and where an early kind is cultivated, it may be ripened and harvested, so as to afford an early sowing of a wheat crop, where it is desired to cultivate a winter variety. The advantage of Indian corn as preceding wheat, lies to a considerable extent in the cleanness of its cultivation, as there are few crops grown among us, where in general the weeds are more thoroughly subdued, than in a well cultivated field of Indian corn.

But the wheat crop may be made a safe and most valuable crop among us. With the exception of those influences and dangers, which no human sagacity or power can control, there

* Appendix M

is no peculiar impediment, none certainly which is insurmountable, to its cultivation. It does not oftener fail than a crop of rye. With the proper choice of soil, the careful selection and preparation of seed, the due preparation of the land, so as perfectly to drain it, to reduce it to a fine tilth, to have it well manured for the previous crop, and then deeply turned, without bringing the sub-soil suddenly to the surface; and by the addition of lime, where lime abounds, to clayey soils, or in a caustic state to land too abundant with crude or acid vegetable matter; and especially by a liberal application of wood ashes, there can scarcely remain a doubt, that the best of wheat may be raised among us at a fair agricultural profit, and to an extent to supply in a great measure our domestic wants. It is easy to see at a glance, that such a result would prove an immense gain to our comforts, to our pecuniary condition; and to our political and moral welfare.

NOTE.—It will be seen, upon examination, that there are several points in relation to the wheat crop, which, in the foregoing discussion, I have not touched, and others upon which I have remarked cursorily and slightly. The apology for this will be found in the fact, that, at the time of the passage of the law ordering a bounty upon wheat, I submitted by order of the Senate a full report on the cultivation of spring wheat, which was published and widely distributed; and I have deemed it proper, as far as I could do so, to avoid a repetition of the remarks then given.

REPORT

ON THE

CULTURE OF SILK.

I. HISTORY OF THE SILK CULTURE IN THE UNITED STATES.—The production of silk in this country has been repeatedly brought before the public ; and presented in various forms as a subject of general interest to the agricultural community. When the state of Georgia was settled, silk and wine were recommended as particular objects of culture. In Virginia measures were taken as early as 1663 to encourage the general production of silk ; and the failure to plant mulberry trees at the rate of ten for every hundred acres, was made by the laws a penal offence. In 1760, the society in London for the encouragement of arts, manufactures, and commerce, offered liberal premiums for the production of silk in Georgia, Pennsylvania, and Connecticut. “The society propose to give for every pound weight of cocoons produced in the Province of Connecticut in the year 1759, of an hard, weighty, and good substance, wherein one worm only has spun, three pence ; for every pound weight of cocoons of a weaker, lighter, spotted, or bruised quality, though only one worm has spun in them, two pence ; for every pound of cocoons, produced in the same year, wherein two worms are interwoven, one penny. These premiums will be paid on condition that a public filature be established in Connecticut, and that each person bring his or her balls to such public filature.” This invitation, says Jared Eliot, in his remarkable essays on Field Husbandry in New England, is

not to a business to which we are wholly strangers ; it is not to an empty, airy, and untried project ; for there has been something of this manufactory carried on for sundry years, and by a number of our people in divers of our towns by which we are assured that it is practicable.* As early as 1747, the governor of Connecticut, Mr. Law, wore the first coat and stockings made of New England silk ; and in 1750, his daughter wore the first silk gown of domestic production.

In an almanac of Nathaniel Ames, for the year 1769, it seems the subject had been matter of much public discussion, and “a gentleman, whom posterity will bless, deposited one hundred dollars in the hands of the selectmen of Boston ; forty dollars to be given to the person, who in the year 1771, shall have raised the greatest quantity of mulberry trees ; thirty dollars to him that shall have the next greatest number ; twenty to the next ; and ten to the next ; certificate being produced from a justice of the peace of the number, and that they belong to Massachusetts Bay.” It is added that, “Justinian, the emperor, looking upon it as a great hardship that his subjects should buy the manufacture of the Persians at so dear a rate as a pound of gold for a pound of silk, dispatched two monks into India to discover and learn how the silk trade was managed there ; and to bring a quantity of those insects from whom he was informed the silk was produced, when they brought at a second voyage, great quantity of silk worms’ eggs.” This writer adds, “It is but of late years that the Europeans fell into the way of cultivating any quantity of raw silk. The Italians led the way : and they have been followed with great success by the French ; and the advantages thereof to these nations are amazing, as they supply Great Britain with raw silk for the thousands of spinners and weavers constantly employed in Spitalfields. It being certain that raw silk is plentifully raised in much more northern climates than this, we have a most promising prospect of one day turning the constant

* p. 129.

course of prodigious sums of money from Spain, France, and Italy into America."

It is further stated by Eliot, in 1762, "that by a late account from Georgia, it appears that the silk manufactory is in a flourishing way. In the year 1757, the weight of silk balls received at the flature, was only 1,050; last year produced 7,040, and this year already about 10,000; and it is very remarkable that the raw silk exported from Georgia, sells at London from two to three shillings a pound more than that from any other part of the world."* It is stated by president Stiles, that in 1762 Georgia exported to London 15,000 lbs. cocoons, deemed sufficient to make 1500 lbs. of silk.

Other remarks of Eliot, considering the time when he wrote, are particularly deserving of attention. He commends especially the cultivation of silk to the northern colonies, "who are destitute of any staple commodity by which they could make an immediate and direct return to England, for such goods as we want, and must always want, more abundantly than we have means at present by which we can refund. This seems to be the state of Georgia, Pennsylvania, and Connecticut." The cultivation of the great staple of cotton was not pursued then to any extent in the southern states.

He goes on to say that, "those among us, who raise silk, say, that it is more profitable than other ordinary business. Some years past, I asked a man of good faith and credit, who had then made the most silk of any among us, what profit might be made of it. His reply was that he could make a yard of silk as cheap as he could make a yard of linen cloth of eight run to the pound. A woman of experience in this business told me, that, in the short time of feeding the worm and winding the silk balls, she could earn enough to hire a good spinner the whole year. I have not the least scruple of the informer's veracity, but how far their capacity might serve for an exact calculation, I know not."

"We labor under such difficulties to make returns for goods

* Eliot's Essays, p. 151.

imported, that many have thought it would be best that we should make our own clothes; and by this means lessen our importation, which indeed would be better than to run into an endless and irrecoverable debt; but there is now a way opened by which, if we are not wanting to ourselves, we may not only continue but increase our importation, for if the same cost, labor, and time, which we expend in making one yard of cloth, if laid out in raising silk will procure two yards of the same sort of cloth, and manufactured by more skilful hands, it is easy to see which is the most eligible method."

In 1772, as appears from the manuscript journal of president Stiles of Yale College, his family engaged, to some extent, in the culture of silk, and their production was sent to England to be manufactured, a sample of which cloth, presenting a singularly beautiful fabric, together with the journal itself, is now in my possession.

About the year 1770, a filature was established in Philadelphia, and it is a remarkable fact that from the 25th of June to the 15th of August 1771, 2,300 pounds of cocoons were brought to the filature to be reeled, or were bought by the managers. These came from Pennsylvania, New Jersey, and Delaware.*

About the year 1760, the culture of silk was introduced into Mansfield, Conn., and some of the neighboring towns. It has been pursued ever since that time, to a small extent, in several other places in New England; but it cannot be said to have maintained its foothold in any other situation than in Mansfield. In other places, where it planted itself with every favorable prospect of success, it presently expired. In Mansfield, Conn., it has continued to be pursued to the present time. The largest amount of raw reeled silk reported to have been produced in any one year in Mansfield, as was stated to me in that town, has been about seven thousand pounds. In general, however, it has not exceeded three thousand pounds per year. The inhabitants of Mansfield have been wholly dependent upon

* Hazard's Register of Pennsylvania, p. 64.

the white mulberry for feed for their worms ; and a large proportion of these were destroyed by the severe winter of 1834-5.

The silk culture became again strongly the subject of public attention in 1826. Congress encouraged it, by the publication and distribution of large editions of manuals and treatises, prepared with great care and fullness, and giving all the directions and details necessary to the prosecution of the business, from the raising of the trees, to the preparation of the article for use. The vast amounts of money annually sent abroad for the purchase of this article of universal use and almost of necessity, the increasing use of the article among all classes of people, and to an extent probably not known in any other country ; and, at the same time, the acknowledged capacity of the country to produce silk, and of the best quality, gave new prominence to the subject in the community, and drew the public attention to it with an intense interest ; but with no greater interest than in an economical view, in the opinion of many intelligent men, its national importance may justly claim.

In 1830, the introduction of a new plant into the country,* which promised from its extraordinary capacity of rapid multiplication, and its productiveness of foliage, to furnish superior advantages for the prosecution of the silk culture, gave a new impulse to the cause, and aroused public enthusiasm to a high degree of fervor. The disappointment occasioned by the almost universal destruction of these plants by the frosts, produced a revulsion in public feeling ; and the progress of the silk culture was again arrested and set back in a strong ebb.

It does not fall within my province to detail more particularly the history of events in relation to this subject. The introduction of this extraordinary variety of the mulberry, the *Morus Multicaulis* or many stalked mulberry, or, as I think it should be called after the name of the spirited individual who brought it into Europe, the Perottet mulberry, led to the introduction of other valuable varieties. About this time the erection of a cocoonery at Northampton, in Massachusetts, of ex-

* The Perottet mulberry, or *Morus Multicaulis*.

traordinary dimensions and expense, and the reiterated and extravagant calculations of profit, which were to follow from the culture of silk, continually given to the public in the most imposing forms, and the establishment of societies in all parts of the country, with large capitals for this object, kept the curiosity and interest of the public constantly upon the stretch. The announced introduction of varieties of the mulberry, of such hardihood as to brave the severity of our climate, and especially the adoption of a plan for taking up the tender varieties and resetting them, or laying them down in the spring ; and the practicableness in this way of obtaining in the same season from trees thus managed, an ample supply of food for the worms, seemed to give strong assurance that the bright hopes which had been indulged on this subject, were at least, in some degree, on the point of being realized.

In the year 1838, a new chapter in the history of the silk culture was to be unfolded. There is little reason to doubt, that, at this time, a conspiracy or combination of some principal individuals, deeply interested in the *Multicaulis* in the United States, was formed, in order to force the sales of this tree at high prices. By every species of finesse, and by the grossest impositions, the public pulse was quickened to a rapidity and intensity of circulation almost unparalleled in the history of the excitements of the human mind. The selling of spurious seed, the disposal of trees under false names, the selling for *Multicaulis* that which did not even belong to the species of the mulberry, and especially the villany, for it deserves no milder name, and should shut out its perpetrators from all community with honest men, of getting up extensive auction sales of *Multicaulis* trees, which were purely fictitious, and this with no other view than that of fraudulent wholesale imposition upon the public, present facts in the history of our community equally remarkable and disgraceful. They are instructive monuments to mark the extremes to which, under the influence of an unbridled avarice, the cunning of some men will proceed, and the credulity of others may be led. In these circumstances the public attention was directed exclusively to the growing of

trees. The production of silk did not enter into the calculation. Thousands and thousands of acres were planted with the Perottet mulberry ; and immense importations of these trees have been made from foreign countries.

By the caprices and fluctuations incident to all human affairs, and by no means unexpected in a case of such violent and extravagant speculation, as that of which I have been speaking, it has happened that the ebb has gone down in proportion to the elevation of the flood. This speculation is at an end ; and though all the growers and speculators in *Morus Multicaulis* from Florida to Maine should pump at the bellows together, they are much more likely to blow out the last embers that remain on the hearth, than to fan them into a flame. It is feared that in too many cases the exposure of the speculation, as it was termed, would present only humiliating examples of fraud and credulity ; and it would be an invidious and ungrateful task to rake open the ashes for the sake of seeing the burnt bones and carcasses of those, who have perished in the flames. The *Multicaulis* is no longer in quick demand, and may be purchased at a price far below its actual and intrinsic value. The tree having ceased to be an object of speculation, it is now hoped that public attention will be directed to the production of silk. The best trees of the best descriptions being obtainable, even by persons of the most limited means, it becomes matter of important inquiry, whether, to what extent, and under what circumstances, the silk culture may be conducted and encouraged as a profitable branch of agriculture.

II. PATRONAGE OF THE STATE.—The State having in this matter offered the most liberal bounties,* it is on this, as well as many other accounts, a subject, which, in my official relations to the State, demands my particular attention. This has induced me to visit all the principal parts of the State, where silk has been cultivated ; and as well as possible to possess myself of the best information which I could obtain from practical and experienced men.

* For Laws of the State, see Appendix N.

The amount of silk produced in the State, and the amount of bounty paid under the law awarding a premium on its production, are given in the subjoined tables, showing also the largest amount of silk and of cocoons produced by any one individual in each year.

Amount of Silk and Cocoons, produced in Massachusetts, and bounty on the same; as obtained from the office of the Secretary of the State.

Year.	Largest quantity.		Lbs. Silk.	Lbs. Cocoons.	Amt. Bounty.
	<i>By one person.</i>	<i>By one person.</i>	<i>lbs. oz.</i>	<i>lbs. oz.</i>	
1836	9 lbs. Silk	296 lbs. Cocoons	36 10	613 02	\$85 20
1837	32½ " "	240 " "	109 01	1,001 08	187 51
1838	39 " "	311 " "	184 01	1,854 15	350 52
1839	52½ " "	615 " "	190 6	2,631 0	397 99
			15 0	270 0	42 00
1840	19½ " "	235 " "	222 06	4,719 8	815 62
			Lbs. 757 8	Lbs. 11,090 1	\$1,878 84

III. MULBERRY TREES. VARIETIES.—In the silk culture it is perfectly obvious that the tree is matter of primary consideration. There are several varieties of the mulberry, on which the worms can be subsisted and made to produce silk, but the trees are of very different values.

1. The BLACK MULBERRY, which is indeed a native of some parts of the country, is of different varieties, and will produce silk though not equally well; but the silk made from worms fed upon this tree is harsh and coarse. The tree will endure our climate well, but for the reasons above given, it is not an eligible variety.

2. The WHITE MULBERRY is not indigenous in the country; and was imported into Europe centuries ago from Asia, but it has now been for years so widely extended, that it is as familiar as any of our native trees. It is universally conceded that

the leaves of the white mulberry are as favorable to the health and growth of the worms, and to the production of silk, both in respect to quantity and quality, as any which is known. The white mulberry is comparatively a hardy tree, though in severe winters it is generally killed at the extremities of the smaller branches; and in the cold winter of 1834-5, when a great amount of the tender varieties of the apple were destroyed, the white mulberry suffered as severely as other trees. At this time nearly two thirds of the white mulberry growing in Mansfield, Conn., and, even trees of an advanced age, were utterly destroyed.

Among the white mulberry trees valuable selections in respect to the size of the leaf may be made with great advantage. Its thriftiness, like that of other plants, depends upon its cultivation, and it is susceptible of great improvement by a careful engrafting of scions from the best kinds, into others of the same species. This mode of improvement has been long practised by European cultivators, and with great success. Among the French, engrafting is considered indispensable.

3. The BROUSSA mulberry is a variety introduced into the country from Smyrna and Constantinople, and propagated without difficulty from the seed. The leaf of this tree is not larger than that of the white mulberry. Its foliage is very thickly set on the branches; and the leaves are thick and heavy, as well as abundant. They are healthy for the worms. They produce a good silk. They endure the climate of New England without injury. I have not seen trees of this kind of any large size; but those, which I have seen, threw up very numerous branches from the root, and yielded a large amount of foliage.

4. The ALPINE denotes another variety, which has been greatly commended. The designation of this variety, if it is to be called a variety, belongs to this country. Samuel Whitmarsh, of Northampton, who has been prominent in his enterprising attempts to introduce the culture of silk into the United States, in 1834, visited Italy and France for the purpose of obtaining from the fountain head, and in the most authentic

form, the desired information in regard to the silk culture. In visiting in Italy the neighborhood of the Alps, he found there a species of the mulberry, said to have been introduced into that country from China, and called the Chinese mulberry, which was in high repute among the silk growers, and which had proved capable of enduring without injury the rigors of a climate as severe at least as that of New England. He brought a considerable quantity of the seeds to this country, and they have been extensively diffused. It is understood that, from the product of these seeds, he has made abundant selections, which he denominates the Alpine, by which name these trees are now generally known. The results from the planting of this seed have not every where given equal satisfaction, and many contend that they are not superior to the white mulberry. It is not for me to become a party in these disputes. There is little reason to suppose that the trees now called Alpine are an original variety. The leaf is of a large size, generally heart-shaped, but many of them with deep indentures or lobed. They endure the winter well. Of their influence upon the health of the worms, and of the quality of the silk, which they produce, I have as yet, no satisfactory information. I have not been able to hear of any exact experiment in the use of them; excepting a small one, to which I shall presently refer.

5. The PEROTTET MULBERRY, or the *MORUS MULTICAULIS*, that is, the many stalked mulberry, denotes another variety of which I have already spoken, and of such pre-eminent notoriety, that it is destined to be immortalized in the history of commercial transactions, if not of agriculture. This tree was brought from Manilla to France by M. Perottet, in the year 1820; and to this country more than ten years since. It is remarkable for its rapidity of growth and the shoots which it throws up; and from this circumstance derives its name. Its leaf is plainly distinguishable from other kinds of mulberry leaf. It is heart-shaped, and has a flaccid, loose, and on its upper side a concave appearance, looking as if the ribs of the leaf were not sufficiently spread to allow of the surface to be

stretched to its full extent, which gives it the appearance of dried clothes before they are ironed. It hangs vertically upon the plant, and to an inexperienced eye, would appear like a leaf in which the circulation had been arrested. I have seen silk of the finest description made from worms fed upon the leaves of this tree. This silk would not suffer by comparison with any other. The worms devour the leaves of this tree greedily, and as far as it has been tried here, it seems favorable to their health and growth. The leaf often acquires a large size, though the foliage would naturally be larger while the tree is small, and formed upon recently grown wood, than it would be if the tree were allowed to form a standard tree, and should attain several years' growth. The great advantages, which are relied upon in respect to this tree, are in the rapidity of its growth, the ease with which it can be multiplied, the abundance of its foliage, and the great facility with which the leaves may be gathered.

This tree has been so much the subject of speculation, that it has become matter of no little difficulty to determine what is true in respect to it. Individuals, under the influence of private interest, have indulged in calculations respecting it, so extravagant, that all sobriety seems at once distanced, and we are transported into the upper regions of pure fiction. The extraordinary value of the tree, however, is unquestionable; and the introduction of it into the country, must be considered a distinguished benefaction; but that it is the best tree for the cultivators of silk in New England, is not so well established.

The tree does not appear to be used, certainly it is not preferred, in China. A gentleman in the vicinity of Boston, who had been himself a resident in Canton for many years, and who could command the services and influence of the most intelligent and influential merchants of that city, ordered two thousand of the most valuable tree used in the country, to be shipped to him. Five hundred of these survived the passage; but the *Multicaulis* is not among them. The American missionaries, who have sent to this country seeds of the best mul-

berry which they could procure, did not, it is understood, find the *Multicaulis* in use in China for the production of silk. The proximity of Manilla, where this tree was found, to Canton, and the constant intercommunication between the two places, would long since have caused the introduction of this tree into China, had it been preferred ; but it is understood to have been carried from Canton to Manilla. It is valued, but certainly is not preferred in Italy ; nor in Germany, where the silk culture, which was given up about half a century since, is now reviving and strongly urged upon the people on the same grounds of public and private economy, on which it is advocated here.

I take the liberty of subjoining, on this subject, an extract from the private journal of a highly intelligent friend, entirely disinterested in the case, who with his family, have recently returned from Europe, and who made the silk culture matter of particular but merely incidental inquiry.

“ When visiting the botanic garden, at Montpellier, Professor De Lisle gave us his decided opinion against the *Morus Multicaulis* as food for the silk worm. One of his reasons was that the leaves, in comparison with those of the French mulberry, are thin and weak, and will not bear a single day’s wilting without becoming dry and crisp, and unfit for the worm. Although the *Multicaulis* is prolific, and the leaves are large, still it produces less in weight than the common French, which bears a red or black fruit, grows freely at Montpellier, sending up straight shoots even from old trees that have been topped down, as they generally are there. Of course the leaves are easily gathered by a sweep of the hand along the branches, an object of importance there, and still more so where labor is dear.

“ The professor’s reasons for condemning the *Multicaulis* is more important there than elsewhere, because the leaves when gathered are sold by the pound to the worm feeders ; and a leaf which lasts good only one day is objectionable. The tender character of the tree too, is an objection at Montpellier, because

though the climate is milder than in the northern parts of France, the sudden changes from heat to cold in the early spring are too severe; whilst further north the leaves start late and suffer less in consequence. If the *Morus Multicaulis* suffers thus at Montpellier, how much more objectionable would it be in our climate that is so liable to these changes."

I will add in this place a quotation from a private letter from France to a commercial house in Philadelphia of the highest respectability, received last autumn :

"The mulberry tree, known by the name of *Morus Multicaulis*, which has been shipped from France to the United States in a very large quantity, and sold there to farmers throughout the country by speculators as the best species, is considered by the French and the Italians as the very worst; and it is now grown only to sell, not to cultivate, at the request of these crazy American speculators. There is no demand whatever for this tree to plant in Europe. It is throwing both money and time away to attempt the *Morus Multicaulis*."

The Chevalier Soulange Bodin, one of the highest authorities in Europe, in a recent private letter, speaks of the "*Morus Multicaulis* as a tree of which much good and much evil has been said; but like other gifts from heaven it is requisite that it should be managed with discretion, which is also a gift from heaven. The rapidity of its multiplication, the abundant product of its leaves, and the facility of collecting them, have certainly very much contributed, whatever may be the final result, to aid in the happy solution of a great question in agricultural and commercial economy, which has agitated with equal emulation the new as well as the ancient world."

These testimonies are certainly disinterested; and I shall leave them to have what force they may upon the minds of the inquisitive and intelligent. It is certain that the tree is not capable of enduring the rigors of our climate, under our present modes of cultivation. In this state it has been repeatedly killed, and in this way great losses have been sustained. I do not despair, however, of its being acclimated here. The peach

in its origin, is a tender plant from southern Asia ; and as that is now sufficiently sure to warrant its cultivation, we may hope that the Perottet mulberry may in like manner become a denizen of our soil. The plant is, in itself, after all reasonable abatements are made, of such extraordinary value that every inquiry and effort should be made, by which its security might be accomplished.

The hazard of its destruction is not in proportion to the intensity of the cold. The season of greatest danger seems to be at the first coming of frosts. Then if the growth is luxuriant and the wood has not become matured, it perishes with the cold. Attempts have been made to preserve it by cutting the shoots near the ground in the autumn, and then covering the root with earth ; this has not succeeded to secure them. Yet there are well authenticated cases in which the trees have been taken up, and then deposited under a wall with the roots merely covered with earth, and they have survived the winter well. This was done in Manchester, Conn. On the same farm, an attempt was made by cutting off the shoots and leaving the roots in the ground without covering, to test their hardiness. It was unsuccessful. The farmer attributed their loss in a degree, to a heavy rain immediately after they were topped, by which he supposed the cut ends became saturated with water which was followed by a severe frost. The fact of their destruction was undoubted.

John Macomber, in Westport, Bristol County, whose nursery I visited, reports, that in the cold year of 1835-6, about one half of his Perottet mulberry survived the winter ; and of those which were engrafted upon the white mulberry, not more than eight out of a hundred perished.

William Kenrick, of Newton, near Boston, whose experience and skill, as a nursery man, are well known, in a recent private letter to me, says, " I have several trees of the *Morus Multicaulis*, standing on Nonantum Hill, in an elevated and bleak situation, trees now of considerable size, which, unprotected, have borne well the severity of our late winters. In

March, of this present year, two gentlemen of Windham County, Conn., called and desired to look at my trees, and brought me in a twig cut from the top of one of the trees, which had ripened to the very tip, and had stood the last most severe cold winter uninjured. Yet I have since discovered that in some parts of the tops of these same trees, some of the young wood did not wholly escape uninjured. Yet in all the low valleys of the northern rivers which have their sources near the boundaries of Canada, and in the low and extended plains of New England, the *Multicaulis* is liable to be injured in its tops by the extreme severity of the winter. In spring they rise up with a luxuriance of vegetation the most extraordinary. Hence the mulberry should be kept low like plantation of raspberries, as is the case in China and in India. In this last named country, the mulberry tree in all its varieties is an ever-green tree, but a deciduous tree in temperate regions. This same system is now extending itself in France, as has already the system of close planting and of low training, been adopted almost universally as to the vine in vineyard culture, in all the north and middle sections of that country."

Mr. Kenrick adds, "In my frequent visits to Portsmouth in lower Virginia, in lat. $37^{\circ} 12'$, in the years 1838 and 1839, both during winter and summer, I have particularly observed extensive plantations; the trees at that place, in their hardihood, bearing perfect resemblance to the oak, the wood of the second year ripening to the very tip. At Middletown, in Monmouth County, N. J., lat. $40^{\circ} 22'$, this same mulberry equally defies the severity of all their winters. This is nearly opposite Staten Island."

"The *Morus Multicaulis* is the only species of mulberry known which grows equally as freely from the cuttings as the willow. The variety called Canton roots not near so freely either from cuttings or from layers, while the Alpine, so called, is still more difficult to strike root, either from cuttings or layers."

Mr. Kenrick has been a highly successful cultivator and

seller of the Perottet mulberry. His character, where he is known, is a guaranty against any intentional misrepresentation on his part. His good fortune in the sale of his trees has enabled him, if so he pleases, to change the plain steel bows of his spectacles into golden ones; but whether it has had any effect upon the glasses themselves, we must submit to the judgment of others.

The Northampton cultivators, as far as I know, universally, and Timothy Smith, of Amherst—upon whose careful judgment and experience much reliance may be placed, as well as Calvin Haskell, of Harvard, who has been a long time engaged in the cultivation of the mulberry—unite emphatically, in the opinion that the Perottet is not sufficiently hardy for our climate; and that to cultivate it with any view to leave it exposed to the rigors of our climate would be a hazardous, and in all probability an utterly futile attempt. The testimony of many other cultivators of the Perottet mulberry, in this State, entirely concur in the opinions expressed above.

With respect to the value of the Multicaulis leaf as feed for the worms, D. McLean, of New Jersey, expresses the opinion that it may be too succulent for the health of the worms; though it does not appear that the worms fed by him on the Multicaulis or Perottet mulberry suffered in this way. This is the opinion of other cultivators of silk; but farther experiments are desired before this point can be established.

Miss Gertrud Rapp, of Economy, Penn., in a letter to the editor of the American Silk Journal, says:

“In regard to the mulberry, I would earnestly recommend, especially to the silk growers of the northern and middle states not to neglect the cultivation of the white Italian or a similar mulberry tree, as by raising the Multicaulis only, the best crops (which are produced in the fore part of the summer,) are lost. The Multicaulis is a most excellent addition to, but not a perfect substitute for, the other kinds. They ought to go together. Several years ago, we received among others a kind of mulberry under the double name of *morus broussa* or *expansa*.

which we now endeavor to multiply (by grafting) as fast as possible, as it possesses all the excellent qualities of the Italian, besides having large, heavy, glossy leaves, which are gathered with less than half the labor of the white Italian. Such silk growers as possess this kind, would undoubtedly do well to propagate it as fast as possible along with the *Multicaulis*." Miss Rapp's authority on this subject is as high as any in the country. The *morus broussa* and the *morus expansa*, or Roman mulberry, which have come under my observation, are quite different varieties.

Among us in general, the Perottet mulberry has been cultivated in low, moist, and rich soils, in which case the growth is continued until very late in the season, and the wood is not sufficiently matured to withstand the frost. If placed, however, in situations less favorable to a luxuriant growth, and to the thriftiness of the tree, the size of the leaf and amount of foliage will of course be lessened.

It is somewhat difficult, in respect to the hardiness of this plant to reconcile these conflicting testimonies, and I shall not attempt to do it. Without impugning, in any measure, the credit of any, however different the results to which they come, we may refer these different results to differences in aspect, soil, location, and cultivation; and encourage the hope that presently the tree may become naturalized and safe among us.

The weight of evidence, however, upon as fair a review of the case as I can take, and from my own extended personal observation, is altogether against its suitableness at present in a permanent plantation for the climate of Massachusetts. I shall speak presently of other modes of managing with it, by which the signal advantages which it proffers may be realized.

6. The *MORUS EXPANSA* OR ROMAN MULBERRY is another plant which has been introduced among us, producing a large leaf, and of a hardy character. I have not known the leaf used in any instance for feeding worms, unless the case of Miss Rapp before referred to, is one; and though I have seen a

good many trees of this kind, yet they have all been subject to a decay or sort of gangrene in the bark, which, unless a permanent remedy can be discovered, will effectually discourage their cultivation.

It does not comport with my particular objects to treat at large of the various kinds of mulberry known ; but only of those grown among ourselves, and upon whose culture and use for the feeding of worms experiments have been made.

7. The CANTON MULBERRY is that which I shall next speak of. 'This is an admirable plant. 'The history of the introduction of this tree into the country I am enabled to give in the most authentic form. D. Stebbins, of Northampton, the intelligent and active secretary of the Hampshire, Hampden, and Franklin Agricultural Society, and ready to lend his service to any and every good work, desired some of the American missionaries to China, to procure some seed of the best tree cultivated in that empire for the feeding of worms. They transmitted parcels of this seed at two or three different times, from which this tree has been grown. In another case, John P. Cushing, of Watertown, a long time resident in Canton, ordered a shipment to be made to him from Canton of two thousand of the best tree for feeding worms, known in that country. Of this importation, five hundred only survived the voyage. These have been carefully nourished ; and with a liberality and public spirit, which has distinguished all Mr. Cushing's efforts to advance the cause of an improved agriculture, he has distributed these plants among his friends and others, and the tree has become extensively diffused. This tree produces a large, heavy, and beautiful leaf. I measured one among many equally large upon the same tree, which was thirteen inches in length by twelve and a half in width. Perhaps, in general, they are not so large as the Perottet mulberry, but they are in this respect little inferior ; and, in proportion to their size, they are considerably heavier. An acre of the Canton mulberry would undoubtedly produce a greater weight of foliage than of the Perottet. They are a tender

tree but more hardy than the Perottet; and they may be propagated with about the same facility. There is little doubt that this tree may be acclimated among us; and it will then prove the most valuable tree, as yet known in the State, for the culture of silk.

Dr. Stebbins, who has entered largely into the cultivation of this tree, passes very high encomiums upon its merits. He writes me, under date of 9th November last, "I have preserved the foliage of the large leaf Canton in preference to the Perottet, having thought that leaf best adapted to the feed of worms, for by experiments of the present year, the result has been as 5 to 8 in favor of the Canton feed." This result was obtained by weighing in accurate scales the cocoons made from each kind of leaf. He adds, "that of the cocoons obtained by feeding upon the Canton exclusively, and the white mulberry exclusively, those from the Canton leaf were one third heavier than the other." Another person from Ohio writes to him, "that the produce of the Canton by the acre is twice as much as that of the *Multicaulis*."

These are strong encomiums; but I believe not undeserved, from what in regard to the cultivation of the tree has come under my own observation. I might add other testimonies in favor of the Canton; among others that of Edwin Newbury—a very exact observer and cultivator of Brooklyn, Conn.; and that of Timothy Smith, of Amherst, Mass., both of whom, from repeated experiments, give their decided preference to the Canton mulberry over all others.

Many persons are inclined to believe that the Canton is not more hardy than the Perottet; Mr. Smith's experience leads to a different conclusion. I have also the pleasure to add here the actual experience of D. Haggerston, of Watertown, the farm manager of J. P. Cushing; and on whose knowledge and skill in the management of these plants as much reliance can be placed as on those of any man in the country. His testimony likewise must be regarded as entirely disinterested.

He states, that with him the Perottet mulberry has been

killed three winters out of five, root and branch ; and two winters to the ground. The Canton trees on the same lot, with the same exposure, have stood the winter, having been killed not below a foot from the ground. He adds, likewise, that of some Canton, which were taken up the last fall, and the roots only covered, in other respects exposed to the weather, all are now (March, 1840,) wholly uninjured. The Canton trees, which were not covered have come out better than those which had some covering thrown over them, besides having their roots buried. Of the trees referred to in the first case, two hundred of the Canton were left exposed and about twelve of the Perottet. Some of the Canton referred to were from seed imported from Canton ; the remainder were part of the original importation of trees, of which I have before spoken. Upon weighing twenty leaves of the Canton and twenty of the Perottet, taken as nearly alike as possible, the difference in favor of the Canton was nearly an ounce. The Canton is as easily propagated as the Perottet ; and as a plant nothing can be more beautiful. The leaf is large, lustrous, heart-shaped, and serrated ; it is not pendant like the Perottet, and is not so thickly set on the tree as the Broussa.

In this discussion, however, having no private interests or partialities, I have nothing to keep back : and I must add, therefore, that there are some cultivators, who still deem it as tender as the Perottet. This may be accounted for, perhaps, in its particular location, if it be placed in a humid and rich soil, and in a situation liable to early frosts. The climate from which it comes is far north of that from which the Perottet is derived. Though from my own observation, and the numerous testimonies given me in the case, I cannot doubt its superior hardiness to the Perottet ; yet it is not as yet to be regarded as acclimated ; and it would be rash to expose any large plantation of the trees to the rigors of winter, until the habits of the plant are better understood.

The singular fact stated by Mr. Haggerston, that those Canton trees, whose tops were left uncovered, suffered more than

those whose roots and branches were both covered, is in a degree confirmed by a statement of Mr. Stebbins. "The last winter," he says, "I left out about half an acre of Canton roots, of some of which I covered the stumps with turf, grass under ; others, with yard manure ; others, with earth ; others, with a little grass, hay, or leaves ; and others had no covering ; and these last were the best preserved ; and the next, those with the slightest covering ; and those with the deepest covering were most injured ; and some entirely destroyed by heat."

The extraordinary and luxuriant growth of which these trees are susceptible under favorable circumstances, is illustrated by a fact communicated from the missionaries at the Sandwich islands in the Pacific ocean. "To show how fast trees grow here," the writer of the letter, to whom some Canton seed had been sent from this country, says, "a tree came up in my garden on the 9th of April. At the end of four months, measuring all the branches, it had grown 87 feet and had 533 leaves. At the end of six months, it had grown 153 feet, and had 939 leaves. It has now (9 January) been growing 9 months and 21 days ; and has grown 461 feet and is now growing at the rate of two feet per day, which at the same rate would give 601 feet of wood to the year ; has two main stalks from the ground ; one is $5\frac{3}{4}$ inches in circumference ; and the other $5\frac{1}{4}$. The greatest height is now $15\frac{1}{4}$ feet."

8. SHARPE'S VARIETY.—I will in this place speak of a variety of the mulberry, which promises to afford what is much desired in Massachusetts ; that is, a large leaf, suitable for the feed of the worms, and which also will endure the rigors of our winter. This is a tree which originated from seed imported from Canton and planted in Belchertown, Mass., ten years since. The original tree stood by the road side. The extraordinary character of the tree attracted the notice of Elias Sharpe, of Chaplin, Conn., who by budding and engrafting has considerably multiplied its product ; and it is now designated as Sharpe's new variety. It produces a large and heavy leaf, heart-shaped—at least those which I have seen—and

strong ; and is relished by the worms. The tree is nearly of an average size with the Multicaulis. Its growth is most luxuriant, where I have seen it engrafted into the stocks of the white mulberry, many of the upright shoots the last autumn measuring from nine to eleven feet, and the side shoots six and seven feet in length. This was the growth of the summer. The tree, from the testimony of the original proprietors, though standing in a most exposed location, has never suffered from the winter ; and within my own knowledge the last autumn, after a frost which destroyed the Perottet mulberry to the ground, the shoots of this tree were uninjured even at the very points or tips. The specimens of reeled silk and of cocoons, which have been produced from the foliage of this variety, have been excellent. This tree appears to be an accidental variety ; and should the expectations which have been formed of it be to any considerable degree realized, it will prove an acquisition of the most eminent importance and value to New England. It has been propagated hitherto only by budding or engrafting ; and the plants, which I saw at Chaplin, in Conn., had been engrafted into stocks of the white mulberry three or four years old.*

IV. MODE OF MANAGING AND CULTIVATING THE IMPROVED VARIETIES.—It will be proper in this place that I should speak of a mode of management both in respect to the Perottet and the Canton, by which the caprices and rigors of the seasons may be defied. This consists in taking up these trees in the autumn and burying the roots in sand in the cellar for the winter ; or in burying the roots and covering the branches, or indeed without covering the branches, burying the roots in some part of the field where they grow, where they will not be liable to be flooded with water, and especially to the alternations of freezing and thawing. For this purpose, a rough board shed would be highly useful. In the spring, the trees may be replanted. Thus the branches or shoots may be cut off, the root set out, and the branches laid down, in which case every bud may be

* Appendix O.

expected to send up a shoot ; or the whole tree may be laid down in the spring. The plants will then form a kind of hedge, and a crop of foliage will be easily obtained for the feeding of the worms in that season. Until the foliage is ready for the worms, however, the hatching of the eggs must be kept back by a process which I shall hereafter describe. In this way a good crop of silk may be obtained, as I have seen in several instances, in the same season.

The idea of extraordinary trouble attending this process at once creates apprehension and objections. But the trouble is not beyond what the occasion will fully warrant. If the plants stand in a line, a plough in the autumn may easily be passed along near to them, and they may be pulled out by the roots, and covered in the field as I have described. In the ensuing spring a furrow may be opened, and the trees laid down root and branch in the furrow, and covered. The covering must be done lightly at first, and after the buds have started, a little more covering must be given to them ; and for this extra labor, which will not indeed be much more than harvesting and planting and manuring an acre of Indian corn, there will be found a compensation in the great facility of gathering leaves from this low hedge of trees, instead of being obliged to climb a large standard tree. Indeed a child in this case would be able to gather as much foliage in an hour, especially as the young wood is flexible and can be bent by the hand so as to be stripped with facility, as a man would gather in six hours from a standard tree. If it shall appear upon further experiment, that the roots can be safely left in the ground, and the shoots taken off and secured in the cellar in the autumn, the advantages of such management may be preferred ; but if otherwise, the removal and resetting of the shrub annually, need not be declined on account of the labor attending it. The experiment has been repeatedly and successfully made, and at the rate of fifty pounds of silk to the acre of the very best quality, as I have seen, have been obtained from the foliage of the Perottet mulberry, planted or laid down in the same sea-

son. This is a degree of despatch and facility in the production of silk highly encouraging. I will remark here likewise, that the roots of these trees, set out in the spring, have produced foliage much earlier than has been obtained from roots, whose shoots were cut off in the fall, and they left in the ground, in those cases where they have survived the winter. In the management above spoken of, the intervals between the rows may be three to four feet, and the trees when laid down in the furrow may be placed so that the top of one may extend to the root of the other; or perhaps it may be more proper to say that they may be laid at full length in the furrows in close succession. Under such circumstances, we may avail ourselves with great advantage of these extraordinarily valuable mulberries, both the Canton and the Perottet. The Canton may be propagated as the Perottet, by layers and cuttings; and the seed is procured without difficulty. The seed of the Perottet, which is a hybrid plant, is not to be depended upon to produce its like. Calvin Haskell, of Harvard, Mass., who has an experience of several years both in the growing of trees and the production and manufacture of silk, had two plants of the Perottet mulberry from among the first, which were brought into the country. From the seed of one of these trees, he has produced trees, which give a leaf not so large as the parent tree, but of large size, abundant, and excellent for the feeding of worms. These Multicaulis seedlings, as he denominates them, after being housed the first winter, endure the climate, are easily propagated, and yield abundantly. I shall give in the appendix some extracts of Mr. Haskell's letter, fully explaining his management.*

From the best information that I can obtain, the Perottet mulberry can be expected to become acclimated only by growing it in high and dry situations, by avoiding to force its growth with too liberal manuring, and especially by preventing any water settling upon its roots. It is not safe to expose any seedling mulberries, certainly those of the tender varieties,

* Appendix P.

to the cold of the first winter. There are few, even of the hardy kinds, which are not likely to suffer by such exposure.

Private interests have been, and are still so much mixed up with the subject of mulberry trees, that great differences of opinion may be expected to exist. Without having the interest of one cent in any mulberry speculation whatever, I have endeavored to collect the most authentic information which I could obtain on the subject; and in cases where what I have stated has not been verified by my own personal observation, I have relied upon persons in whose credibility I know that I can place confidence.

V. MULBERRIES FROM SEED.—In attempts to produce mulberry trees from seed, severe disappointments have been often experienced. New varieties are often produced; but inferior plants likewise often show themselves. G. B. Perry, of Bradford, in an excellent essay on the culture of the mulberry, given in the *Essex Agricultural Transactions* for 1839–40, expresses an opinion that this may often arise from sowing improper seed, or the seed of inferior plants; and in a German treatise on the silk culture, which I have recently received, a caution is given not to sow seed from plants whose leaves have been stripped for feeding the same year. These are reasonable and valuable suggestions.

As far then as the trees are concerned, the farmers of Massachusetts have within their reach the best varieties yet known. These may be propagated with perfect ease and to an indefinite extent. It would be desirable even to increase these varieties; and for every farmer engaged in the culture of silk to cultivate some of the earlier kinds as well as the later, that he may begin the feeding of worms early, or that in case his eggs should prematurely be hatched, he may have a supply of food at hand before it can be expected to be obtained from the tender varieties. This is recommended by the experience of Miss Rapp, already referred to, as well as of many others.

It is not within my province to give a full treatise on the

culture of silk ; and from the mulberry I pass on to other subjects, in respect to which information of a practical nature seems to be mainly desired.

VI. AMOUNT OF SILK TO AN ACRE, AND COST OF PRODUCTION.

—Questions of great importance come up here, respecting the amount of silk which may be produced upon an acre of ground, and the cost of production at the rates of labor existing among us. On these subjects conjectures abound ; and calculations respecting the amount to be obtained so enormous and extravagant, that they are much better suited to form a chapter in the Arabian Nights' entertainment, than to enter into the thoughts of any sound mind. Conjectures, however, in matters of this kind, are not what we want ; and it does not belong to me to present them to the farmers of Massachusetts. I have to lament, however, that few exact experiments in this case have been made in the country ; and that many points, the decision of which, in my opinion, is more likely to have a favorable than an unfavorable influence upon the silk culture, remain to be determined. In my intercourse with the agricultural community, the mortifying conviction is continually forced upon me, of the very small number of persons, upon whose authority any strong reliance can be placed for that exactness of observation, which constitutes the first element of all true science, and all useful and practical information. It is said that in the map of the world in use among the Chinese, and to which they go to study geography, the empire of China occupies about two thirds of the whole surface. Too many of our farmers in their sketches of their own domains, and their own operations, are too prone to measure things by this Chinese scale. I shall have the pleasure, however, of referring to some authorities entitled to entire respect and confidence, to the extent to which they go.

1. Timothy Smith, of Amherst, who has had considerable experience in the production of silk, says in a letter to me, "I consider that one acre of white mulberry, set in hedge rows,

will yield foliage for fifty pounds of silk ; and presume to say that an acre of *Multicaulis* (Perottet,) will yield double the quantity to an acre of white. I consider that reeled silk cost me about two dollars per pound, not over ; although it was a year of experiments ; but feel confident that in two or three years, by using the best kinds of mulberry and the better economy, that silk can be made for one and a half dollar per pound."

In a subsequent letter, Mr. Smith remarks, " I consider the *Multicaulis* the most tender variety of any that I have cultivated. I consider the Canton as my best mulberry tree for raising silk, taking into consideration the hardihood of the tree, and the quantity of foliage it yields. I like the Italian white ; and think it best to cultivate some of each variety."

I understand Mr. Smith here to estimate, in the cost of the silk, the value of the labor only ; and to charge nothing for the use of the land and the cost and care of the trees ; nor any rent for his cocoonery. These items would add something to the cost of the silk, but it is not easy to calculate them, from the imperfect elements which are given. It will be seen in this case, that although Mr. Smith has had some experience in the production of silk, yet that his statements are somewhat conjectural. In his supposition, likewise, that he could obtain one hundred pounds of silk from an acre, planted with the Perottet mulberry, and that he hoped to reduce the cost of the production of reeled silk to one dollar and a half per lb., a little allowance is perhaps to be made for the quickness of pulse, which in that time of excitement was felt by every cultivator of mulberry trees in his visions of the profits of the *Multicaulis*.

2. The next approach to the actual cost of the production, is presented by James Deane, M. D. of Greenfield, Mass. His admirable letter to me on the subject, I shall give in the appendix.* He estimates the cost of producing reeled silk at from two to two dollars and a quarter per pound. He produced the last year several pounds of silk of as fine a description as could be

* Appendix Q.

made. When he undertook the culture of silk, he had never seen a silk-worm nor a silk reel. He constructed a reel admirable for its simplicity and efficiency, of which I shall give an engraving;* and his operations from the beginning to the end were crowned with perfect success. This demonstrates the great simplicity and feasibility of the operation. Dr. Deane is so remarkable for his carefulness, that his statements, where statements are given, may be implicitly relied on. The cost of producing the silk, however, is with him rather a matter of estimate or judgment, than of a careful observation of every minute charge; and, like Mr. Smith's, embraces only the labor applied.

3. The next authority to which I refer, is, that of D. V. Mc Lean, of Freehold, Monm. Co., New Jersey. No experiment has been given to the country so numerous in its details and instructive in its results, as this. From the time employed and the wages paid for the production of twelve pounds of silk, he comes to the conclusion, that raw silk may be produced and reeled at the rate of two dollars to two dollars and one quarter per pound, though he admits, that "his cost him much more than this." This likewise is to be understood as the cost of the labor only applied to the production of the silk from the eggs; and without any allowance for land, trees, or cost or rent of cocoonery.

4. In Mansfield, Connecticut, it is customary with those who have trees, to furnish the eggs, to board the woman employed in the process, and to allow her half the produce in silk. She performs all the work, from the hatching of the worms to the reeling of the silk. The board of a woman in this case is estimated at one and a half dollar per week. I have no means of ascertaining how many worms a woman would be able to manage. The general estimate is, that one woman will feed 60,000 worms. It has been stated to me, that in one instance, one woman took the care of 120,000 worms; but I am unable to obtain the particulars of the case; and to learn whether she had any aid in picking the leaves or not. In the commence-

* Appendix R.

ment of the feeding, the time of one woman would not be occupied entirely by an amount of worms, which at the close of the feeding season would require her whole and exclusive attention. Various circumstances, likewise, must come into the account ; such, for example, as the facilities for feeding the worms ; whether the leaves are to be gathered from high standard trees or from shrubs ; and whether they are to be plucked from the white mulberry or the improved varieties. In the improved cocooneries small cars fixed upon a rail-road are used to convey the leaves from one end of the room to the other ; and at a great saving of labor and time. The use of hurdles, likewise, so as to facilitate the cleaning of the worms, will serve to lessen the labor. Practice and experience, as in all other cases, may be expected to bring with them their usual advantages. Under these circumstances, it is not easy to determine how large a family of these industrious and hungry operatives may be placed under the stewardship of one person. In Mr. Smith's operations, two women were occupied about five weeks in feeding the worms for the production of about twenty pounds of silk ; but how long was required for the reeling is not stated. They received three dollars each per week, and board, which must be rated at one dollar and a half each per week. In Mr. McLean's experience, the labor of two women and a man twelve weeks each, would be required to attend upon one acre or 160,000 worms ; and he estimates their expenses, including board, at three dollars per week each. These wages might be deemed ample for a woman's labor, but it is not more than half of the cost of man's labor in Massachusetts. Mr. McLean's cocoonery, which I had the pleasure of visiting, combines many advantages of construction ; and his foliage was gathered from the Perottet mulberry, planted the same spring, and growing luxuriantly directly in the vicinity. His experiment, however, though conducted in a manner creditable to his remarkable intelligence and public spirit, cannot be said to determine in a satisfactory manner the cost of production ; though I think it fully decides the question at the present prices of raw silk

and of sewings, in favor of the profitableness of the culture, within reasonable limits ; and at a fair value of land, labor, and trees. Any very great increase of production must of course be followed by a reduction of price.

5. Calculations made by John Fitch, of Mansfield, Connecticut, are as follows. I have not the pleasure of a personal knowledge of Mr. Fitch ; but his reputation is a guarantee for the correctness of his statement. It is, as will appear, somewhat matter of judgment, but, I presume, founded upon experience.

One acre of full grown trees, set one and half rod apart, will produce forty pounds of silk.

The labor may be estimated as follows.

For the three first weeks after the worms are hatched, one woman who is acquainted with the business ; or children, who would be equal to such a person.

For the next twelve or fourteen days, five hands, or what would be equal to five, if performed by children. In this period, two men with other help would be employed to better advantage, than all women and children. This period finishes the worms.

For picking off the balls, and reeling the silk, it will require about the same amount of labor, for the same length of time, as the last mentioned period, which may all be performed by women and children. The aforesaid labor and board may be estimated at eighty dollars ; spinning the silk at thirty-four dollars ; forty pounds of silk at the lowest cash price, is now worth two hundred dollars, which makes the following result :

40 lbs. of Silk at \$5 per lb.		\$200 00
Labor and Board,	\$80	
Spinning,	34	114 00
Net profit per acre,		\$64 00

The principal part of the labor may be performed by women and children ; but where the business is carried on to a

considerable extent, it is considered more profitable to employ some men for the last period of the worms."

This account of Mr. Fitch, it will be seen, makes no allowance for any capital invested in trees, land, or buildings; or for expenses which the care of the trees, land and buildings may require; and it refers only to the use of the white mulberry as standard trees.

6. The calculation of an intelligent silk-grower at Manchester, Connecticut, and who is a cultivator of the Perottet mulberry, is as follows. He estimates the value of the trees at 25 cents each, and he requires three thousand to stock an acre.

Cost

Of trees for an acre, ...	\$750 00
Value of Land, ...	100 00
Capital invested, ...	\$850 00
Interest on 850	51 00
Labor in picking leaves, ...	25 00
Labor of feeding worms, and reeling silk, ...	50 00
Extra manure for land, ...	20 00
	\$146 00

Return.

50 lbs. of Silk at \$5 per lb.	250 00
Deduct charges, ...	146 00
	\$104 00

The labor here is undoubtedly underrated. The number of trees upon an acre, 3,000 is also underrated, unless upon the presumption that these trees are counted before they are laid down; if laid down in a furrow they would be multiplied many times. In Mr. McLean's case, there were 5,500 trees upon a quarter of an acre, or, 22,000 upon an acre. The price of silk, is in a considerable degree, capricious. The quantity produced upon an acre is matter of fair calculation. I do not rely

with much confidence upon this statement ; but I give this example for the sake of showing how difficult it is, even with observing men, to arrive at any certain result.

7. T. W. Shepard, of Northampton, fed worms to an amount not known, but supposed from 75,000 to 100,000. Commenced feeding about the middle of August ; and the worms wound in about five weeks. The worms were of the two crop kind. About 2,150 lbs. of leaves were picked from small Alpine and white mulberry trees ; all the leaves were stripped off with many of the small branches ; and owing to the lateness of the season, many leaves were very rusty. All the labor of picking leaves, tending the worms, and preparing bushes for winding, was performed by one man in five weeks, except paying a boy three dollars for picking leaves ; and the first two weeks, the man was not engaged more than half the time. The cocoons measured twelve bushels ; one bushel was saved for seed ; and the remainder reeled by a young girl, totally ignorant of the business, having never reeled an ounce before. The amount of silk reeled was eight pounds. Under the most favorable aspect, the cost in this case, cannot be considered less than three dollars per lb. for labor only.

VII. PRODUCT OF AN ACRE.—Of the yield to an acre, the most various calculations have been made. I should deem myself poorly occupied to go into the extravagances of some persons whose brains on this subject seem to have been turned, if in truth they had any brains to be turned ; and should, in the present condition of the silk culture, deem it safe to rely only upon what has actually been accomplished.

Joseph Conant, of Mansfield, Connecticut, trained to the culture of silk from his childhood, and upon whose intelligent and calm judgment, I should place much reliance, says, that an acre of land may be expected to produce from thirty to fifty pounds of silk. D. V. McLean obtained at the rate of 48 lbs. ; or, allowing for waste and accident, at the rate of 50 lbs. to the acre. He adds, that he should utterly despair of obtaining 104 or 128 lbs. to an acre. Mr. McLean's product, under the circumstances of the case, may be regarded as a medium pro-

duct ; but how much more may be obtained it would be idle to state, until some exact experiments have determined this important point. I have before me various calculations of 100 lbs. 150 lbs. 167 lbs. 185 lbs. 333 lbs. 666 lbs., to an acre ; but I have little sympathy in the hallucinations of those minds which prefer moonlight to clear sunshine. Fifty pounds of silk to an acre then affords the only safe basis on which at present we may make our calculations as to the profit of the business.

VIII. QUANTITY OF LEAVES TO A POUND.—There are some other points connected with the culture of silk, to which it seems proper to refer. In all cases of this nature, well established facts are what we mainly seek after. When I speak of well established facts, it will be understood that I do not estimate testimony merely by the number of witnesses ; for with respect to agricultural matters, as in other matters, a large portion of mankind in what they state only echo the sentiments of others, and they perhaps persons not very competent to teach ; and are like parrots, who can utter only what they have heard others say.

It is often stated that one hundred pounds of leaves will feed worms which will make 1 lb. of silk. Aaron Clapp, of Hartford, states, that 80 lbs. of the Perottet mulberry leaves will do it, and this is asserted by many others. I do not learn from Mr. Clapp's conversation or his book, that this result has been reached by actual trial ; but like the boy, who had learnt his multiplication table, when asked if he had been through his arithmetic, replied that he had been so far as to see through. The problem, however, has, perhaps been more nearly solved by some others, and to their authority we shall defer.

Ralph Storrs, of Mansfield, Connecticut, states, that it requires 200 lbs. of the white mulberry leaves for one pound of silk. Joseph Conant of the same place, says, from 100 to 120 lbs. of leaves will make one pound of silk. I cannot reconcile the difference in the testimony of these two gentlemen, both of whom are experienced in the silk culture ; but by supposing that they have never made an exact measurement in the case ; or that the

former in the weight of leaves included the weight of small branches or twigs, which were collected with the leaves.

I have, however, two testimonies, which rest upon exact measurement. Mr. McLean says, that the whole number of worms fed upon his quarter of an acre was 40,000. The weight of leaves consumed, 2,576 lbs. Amount of cocoons produced, 130 lbs., weighed just as taken from the shelves, without sorting or flossing. After they were sorted and flossed there was 1 lb. of floss and 4 lbs. defective cocoons, leaving 126 lbs. of cocoons. These produced 12 lbs. of merchantable reeled silk, 16 oz. to the lb., and 1 lb. wastage, ends, &c. From the above statement it will be seen, that it required between 19 and 20 lbs. of leaves to make 1 lb. of cocoons. Of these cocoons, without flossing or sorting, it required 10 lbs. and 10 oz. to make 1 lb. of reeled silk. After they were flossed and sorted, it required 10 lbs. and 5 oz., or about 214 to 215 lbs. of leaves, to make 1 lb. of reeled silk. These were the leaves of the Perottet mulberry. After making various allowances for waste leaves, Mr. McLean thinks it may require 190 lbs. of leaves to make 1 lb. of silk. The first statement is the result of an actual trial ; the latter is matter of opinion.

Mr. Shepard, of Northampton, in an experiment made by himself, the last summer, found that it required 240 lbs. leaves and twigs of the Alpine and white mulberry to 1 lb. of silk. He adds, that had all the leaves been free from stem and rust, probably 200 lbs. would have been an ample supply for a pound of silk. These are the statements of a gentleman of perfect credibility, and the result of exact experiment. They are to be disproved only by more full, more exact, and repeated trials.

To his account Mr. McLean adds ; "last year I produced at the rate of 510 lbs. of cocoons to the acre ; this year I produced at the rate of 520 lbs. ; and my deliberate opinion is, that more will fall below this standard than will exceed it ; and in one case, where a less quantity of leaves will give the above quantity of silk, two cases will occur that will require a greater."

The exactness, caution, and frankness of this gentleman are worthy of all praise.*

IX. VARIETIES OF THE WORM.—Of the worms used for the production of silk, there are several varieties ; some distinguished by the shorter or longer time in which they perform their work and pass the period of their existence ; and others for the quality of the silk made from them. The sulphur cocoon makes a coarser thread than some other varieties. The six weeks worm will yield the most silk. The three weeks worms can be made to produce two crops, if they are carefully managed ; if not particularly attended to they will require four weeks in which to complete their winding. The mammoth white require four weeks ; and make two-thirds as much each time as the six weeks worm. A new and beautiful variety, forming, from its being depressed in the middle, what is called the pea-nut cocoon, has been much approved, both from the beauty of the silk produced from it as well as from the little waste to which it is liable in winding, it running off in reeling almost without leaving any thing.

X. QUANTITY OF COCOONS FOR ONE POUND OF SILK.—Of the number of cocoons required to weigh a pound, or the number required to produce a pound of silk, very different statements have been made. Cocoons are measured in Mansfield, Conn., by the bushel. The measures are evened, or as sometimes termed, struck, and four quarts additional are allowed to each bushel thus measured. The weight of a bushel of cocoons will vary from seven to nine pounds. The quantity of silk to be obtained from a bushel of cocoons will depend on the quality of the cocoons. The weight of cocoons will be affected by the time which has elapsed after the stifling of the moth or chrysalis.

With Mr. Smith, of Amherst, one bushel of pea-nut cocoons gave one and a half pound of reeled silk. Of the sulphur co-

* Appendix S.

coons, one bushel produced one pound of reeled silk. This shows an extraordinary difference. Mr. Haskell, of Harvard, requires ten to twelve pounds of cocoons to make one pound of silk. With Mr. McLean it required 10 lbs. 10 oz. of cocoons without flossing or sorting, and 10 lbs. 5 oz. after they were flossed or sorted, to produce a pound of reeled silk. He found likewise, that it required 19 to 20 lbs. of leaves to make 1 lb. of cocoons. With Mr. Shepard 13 bushels of cocoons produced 9 lbs. of silk. In Mansfield it is considered a fair task for a girl to pick 60 lbs. of leaves per day; this, it is understood, is from standard trees. From trees in a hedge row, or accessible from the ground, a very much larger amount can be gathered.

XI. NATURAL AND ARTIFICIAL MANAGEMENT.—We may yet expect great improvements in the culture of silk. The method of culture to which I have referred is denominated the natural method. In Mansfield the fixtures are of the most simple character. A rough shed or barn is used for a cocoonery; and no provision is made for artificial heat beyond the closing of the window shutters in damp weather. It has been said that electricity will sometimes destroy the worms. Mr. McLean informed me that a heavy thunder storm occurred during his feeding, and the lightning struck in the immediate neighborhood of his cocoonery, but his worms experienced no injury. In Mansfield the worms are ordinarily cleaned three times in the course of feeding, and are fed three times a day. The Mansfieldians are of opinion that a cold is more favorable to the production of silk than a warm season.

By what is called the artificial process, pursued with extraordinary success at the experimental farm in France, under the direction of M. Camille de Beauvais and with the patronage of the government, the whole operation is much abridged in respect to time, and the quantity of silk produced from the same number of worms is considerably increased. The plan is to keep up an even temperature in the cocoonery as high as 75° Fahrenheit, and to feed the worms day and night to the full extent which they can be made to consume. I shall sub-

join to this report a table most ingeniously drawn up, in which every step in the process is minutely and clearly detailed. This, in my opinion, will be almost invaluable to the cultivator of silk, as condensing in a small compass, the most important and useful information.*

The Messrs. Cheney, of Burlington, New Jersey, have experimented upon this artificial process, the last year, with success. The worms completed their winding in twenty-four days; and they have strong hopes to reduce the time required to twenty-two days. It is stated that, in proportion to the shortness of the time occupied in conducting the worm to maturity through the various stages, by incessant care, and the most liberal feeding, the quantity of silk is increased and its quality improved.†

In the German pamphlet to which I have referred, it is stated that “by this mode of management, M. Beauvais has obtained from every half ounce of eggs, sixty-eight pounds of cocoons, whilst, in the south of France, they commonly obtained only twenty-five pounds, and in the north of Germany, with proper care, from forty to forty-five pounds.” By this method, they can bring four generations of silk worms to spin in one year, and so have four silk harvests.

These are certainly great points to be attained. Such refinements in the cultivation, and so much pains-taking, may, by some, be regarded as discouraging; but they involve no mystery, and the extraordinary advantages to be obtained promise an ample compensation for much expense and labor. How far they may be suited to what may be strictly called household arrangements, or where the silk culture is pursued altogether as an incidental or subsidiary branch of husbandry, is a matter of easy calculation, and which any one may determine for himself.

XII. PROVISION FOR WINDING COCOONS.—For the use of the worms in the winding of their cocoons, various arrangements have been made. In some cases, strips of lathes raised upon

* Appendix T.

† Appendix U.

a board, leaving about an inch space between them and the board, and placed at proper distances apart, have been adopted ; in some, small branches of rye straw, tied near the middle and spread at each end so as to form a shape like an hour-glass and forced between the shelves so as to spread the ends, have been much approved. Mr. McLean preferred oak branches, and Mr. Deane hemlock branches laid for the worms, as being a more natural resort for them, and occasioning little loss of silk in removing the cocoons. Benjamin Benson of Smyrna, Delaware, was kind enough to show me an invention for winding the cocoons, simple in its construction, and which is exceedingly well contrived. The subjoined is his description of it.

“Take two strips of board equal in length to the hurdle on which the worms are, and four inches wide ; nail common plastering laths on the edge of these boards ; the laths must be just as long as the hurdles are wide—to be one and a half or two inches apart ; nail a lath at each end of the top edge of the boards ; cut common wrapping paper into strips one and a half inch wide, and sufficiently long, and hang them over each lath about two inches apart, until the whole frame is filled ; take waste paper or muslin, or any other material that will suit, and paste over the top, and on the laths and paper, which serves to darken the inside and secure the strips of paper ; drive a small peg in your spinning frame at each bottom corner, which will bring the spinning frame near the top of the hurdle ; when the worms wish to spin, slide in the frame upon the hurdle.” I am doubtful whether this description will make the matter plain ; but to me, the machine itself, if so it may be called, seemed extremely well designed and adapted to its objects.

XIII. IMPROVED COCOONERIES.—The same person has invented what he calls a revolving hurdle bottom, of which I have seen only a model. This is designed, by means of an apron or cloth performing an endless revolution to accomplish with

great facility the cleaning of the litter of the worms, and at the same time serving to ventilate them. This is adapted to perform in a few minutes the labor of hours under the old system.

Its utility, from trial, has been certified by the most respectable references. As well as I could judge from the model exhibited, it offers a great improvement in the management of the worms. It is difficult to describe machinery of this nature so as to be perfectly intelligible; but Mr. Benson has promised me a model of his revolving hurdle and other ingenious apparatus, which I shall take pains, as well as I can, to exhibit hereafter to the farmers of Massachusetts. They seem to me well deserving of their attention.

XIV. MODE OF DELAYING THE HATCHING OF THE EGGS.—In attempts to raise worms upon the leaves of the improved varieties, such as the Canton or the Perottet mulberry, and from trees planted or “layered” the same season in which the foliage is expected to be used, as in Mr. McLean’s experiment, it will be important to keep back the hatching of the eggs until the leaves are ready for use. This has been a matter of no little difficulty. In Mr. Cheney’s case, he speaks of having kept them in a refrigerator, an article of furniture well known. Mr. McLean’s method of keeping them is well described by himself.

“My eggs were saved with great care from my best cocoons on muslin, the pieces of muslin rolled up in the fall or soon after the eggs were laid, and placed in a common farm bag, and this was hung to a beam in the cellar. In March, the muslins were folded up; and laid one on top of another in a small tea chest lined with lead, this was placed in another of the same kind, but a little larger; and the space between the two was filled with pulverized charcoal. Then a few thicknesses of old flannel were laid loosely over the top of the smaller chest, and a loose board over the larger. Then the whole was set in a still larger rough box with a loose board on the top, and this was put down in the ice house, so that the ice surrounded the sides of the box. In the inner tea chest was a

thermometer; the box was examined every week; and the mercury was not allowed to rise above 45° Fahrenheit. The above plan succeeded with me to perfection; the last hatching, on the 27th of August, was as perfect as the first."

The same method was adopted with like success by a gentleman at Bristol, Pennsylvania, who informed me that he kept his eggs perfectly until September. I have known severe disappointments and losses experienced by bringing the eggs too suddenly from the cellar or ice house to a high temperature. The transition must be gradual or it may be fatal to the worms. In some cases the hatching has been commenced before the eggs were transferred to the ice house. This of course would be fatal. The eggs are hatched at a temperature of 82° to 86° Fahrenheit.

XV. DESTRUCTION OF THE MOTH.—To destroy the chrysalis or moth various modes have been tried. The exposure to a hot sun will generally kill them, though this mode is not always certain. Baking them in an oven after the bread has been drawn, is sometimes done, though the silk is liable to be injured in such case by an excess of heat. I have known the moths destroyed by the steam of boiling water. In this case the cocoons are put into a sieve and covered with a cloth, and held a short time over the steam of boiling water; after which they must be dried. Putting them in a tin vessel and plunging them into a vessel of water heated to 202° Fahrenheit, will be found a convenient and effectual mode. Gertrud Rapp, of Economy, Penn., who, as much as any one, is in this case entitled to speak with authority, prescribes another method.

In a letter dated in February of this year, to G. B. Smith of Baltimore, the editor of the American Silk Journal, a gentleman entitled to the highest praise for the intelligence, perseverance, and public spirit, with which for several years he has urged the introduction of the silk culture into the country, Miss Rapp says; "Since we are killing our cocoons with campher, we find them as easy to reel, at any time after the regular season, as

when freshly taken from the spinning shelves. We do it as follows; for 100 lbs. of cocoons in the floss, we take a well made box large enough to hold them; then we take about three ounces of camphor, which we moisten with as much alcohol as is necessary to rub it into a powder, a part of which we sprinkle on the bottom of the box. Then we fill the box by making five or six layers of the cocoons, and spread a proportional part of the camphor between each of them; then we screw on the lid and paste strips of paper on all the splits and joints to make it air tight. After three or four days we take them out and dry them in the shade, until perfectly light. They must be assorted before camphoring, or else the bad cocoons will spoil the good ones." It would be desirable, if possible, to reel the cocoon immediately after the winding is finished, without the trouble of killing the chrysalis; but this, where any considerable amount is produced, cannot be always done; and a mode therefore of killing the moth without injuring the reeling of the silk, like that recommended by Miss Rapp, deserves consideration.

I have spoken of the high authority of this lady in what pertains to the silk culture. No individual in the country has probably done so much; and, in what she has done, has done so well. I have a vest pattern of black silk velvet, and as many as ten different patterns of wide silk ribbons, the material and the manufacture the produce of her own labor and skill, which for their texture, lustre, coloring and finish, would not suffer in comparison with the best foreign fabrics of the same description. I have great pleasure in paying this deserved tribute to distinguished industry and enterprise, much too rare not to be admired, in this most useful art.

XVI. REELING AND REELS.—The reeling of silk is not a difficult but a very nice operation. The objection to American silk has been in the imperfection or faults of the reeling. The perfection of reeled silk consists mainly in the evenness of the fibre. To effect this requires not only care but judgment. The worm

in forming his cocoon, pours out the viscid matter from which the silk is made from his nose, and this becomes hardened in the air. At its first coming out it is in its largest form, and becomes gradually more attenuated as the worm becomes exhausted. The filament or thread from a cocoon is from 750 to 1150 feet long. Whatever number of cocoons are taken, to form a thread, it will be larger at first than it would be afterwards unless care and judgment are used in uniting additional cocoons as the original fibre diminishes in size, in order to keep up the evenness and equality of the thread throughout. In doing this as it should be done, and in carefully uniting the filaments when by any accident they become broken, or are run off, consists the perfection of the art of reeling.

Various reels have been invented for the purpose of executing this work. I have seen three only in operation. The Piedmontese reel is universally admitted to combine simplicity of form with excellence of execution. Adam Brooks, of Scituate, Mass., has invented an ingenious reel by which the reeling and spinning are performed by one operation. It has much merit; but is liable to the objections, which usually apply to machines, which attempt too much. In performing two operations it does neither of them so well, as if only one were undertaken at once. The third reel to which I refer, is one made by James Deane, M. D., of Greenfield, of which I have already spoken. It is beautiful from its simplicity and the perfect manner in which it executes its work; and it is likewise recommended by the smallness of its cost. We must not, however, expect to find any machine so complete as not to require a vigilant and intelligent superintendence. Even the human hand, that most perfect of all machines, can very poorly discharge its office without the light of the eye and the guidance of the judgment.

XVII. DOMESTIC INDUSTRY.—Mrs. Brooks, who claims some share in the Scituate reel, to which I have referred, has distinguished herself for her zeal and success in the culture of silk, in which for ten years she has been more or less engaged. She mer-

its most justly a part of that brilliant eulogium, which the author of the book of proverbs has pronounced upon a good woman. I do not say that she has not just claims to the whole ; but it is not within my province to adjust that account. "She layeth her hands to the spindle ; her hands hold the distaff. She maketh herself covering of tapestry ; and her clothing is silk and purple."* Mrs. Brooks has produced and completed from the egg three full gown patterns of silk ; and considerable quantities of sewings. She surprised me by saying, that if her silk cloth could be sold for one dollar per yard, taking in the whole affair of production and manufacture, she could get one dollar per day for her labor. My surprise, mingled with some incredulity, has not wholly ceased. Her veracity is beyond question ; but something must be allowed for the enthusiasm with which success has inspired her ; and if there be no error, yet I fear there may be a little poetry in the calculation. It is almost universal since the introduction and extraordinary improvements of manufacturing machinery, to mourn over the decline of household industry properly so called ; to speak of it as we are accustomed to speak of the existence of some ancient cities, as a thing that was, but which has now become purely matter of history ; what our grandmothers performed with their own hands, as only suited to point the moral of some story in a winter evening ; to consider it now not the province of women to make the clothes but to wear the clothes ; and like other beautiful flowers, referred to in the sacred book, with which nature is adorned, though they may array themselves in the gorgeousness of regal magnificence to regard them as no longer doomed "to toil and to spin." The eminent industry of Mrs. Brooks and Miss Rapp will do something towards redeeming the character of our own countrywomen from a reproach but too often cast upon them by those who seek to find an apology for their own indolence, extravagance, and want of enterprise in the imagined and magnified deficiencies and faults of others.

* Prov. xxxi. vs. 19, 22.

XVIII. MANUFACTURE OF SILK.—It does not properly belong to my report to say much of the manufacture of silk, excepting so far as it is a household concern ; and as a manufacturing establishment would afford to the farmers a market for their cocoons. In some places, this would be a great advantage. Several establishments for the manufacture of silk have been erected in Massachusetts and New England. Many manufacturing establishments in New England, some silk among others, have been undertaken upon too large a scale, and too far in anticipation of the actual wants or capacities of the community. Some of them being thus top-heavy have fallen by their own weight ; and others have remained like the leaning tower of Pisè, the wonder of spectators, how they sustained their position. The extraordinary caprices of public affairs, and the embarrassments and fluctuations of the currency, and the explosions of many of the banks, which like the bursting of pieces of cannon, prove often most destructive to those who have the handling of them and scatter their bleeding fragments in the air, have operated greatly against many manufacturing establishments among us.

The policy of the government has not been favorable to the production of silk, if an impost is to be considered as favorable. The removal of all duty upon silks, other than sewings, excepting a merely nominal duty of ten per cent. upon those from beyond the Cape of Good Hope, favors the cheap, ill-fed and unrequited labor of Europe and Asia ; but it destroys all competition on our part. The imposition of the enormous duty of forty per cent. on sewings, which it was thought from its magnitude would amount to a virtual prohibition, in its large amount defeated its very object ; for in an article embracing so large a value in so small a bulk, and so easy of being smuggled, it amounted, virtually, to a premium on its illicit introduction.

I had, however, the pleasure of visiting a manufactory of silk at Nantucket, on a small scale, but well conducted ; and which it is thought will demonstrate the practicability of man-

ufacturing silk to a profit. The cost of the establishment in this place is about \$15,000. It is calculated under full way, to manufacture 175 lbs. per week into sewings. It is understood that the investment in machinery should pay from nine to fifteen per cent. ; that nine per cent. should be charged on the buildings ; fifteen per cent. on all perishable articles ; and six per cent. on the active stock. The cost of manufacturing, including all extra expenses, is estimated at \$1,26 per lb. ; or the manufacturer professes himself willing to take a lease of the establishment from the owner, paying as rent \$2 per pound for the silk manufactured. The raw silk purchased from Smyrna, costs in Boston \$4,28 per lb. cash ; the manufactured silk sells for \$8,10, and a credit of four months is allowed. What is technically called the weighting of silk, is increasing its weight by the dye-stuff, which is used. By the use of sumac, the weight is increased from 2 oz. to 3½ oz. per lb. It is said that abroad, a preparation of lead is often used with sewings, both to increase the weight of the silk, and render it more glossy and brilliant. I suppose this may be mentioned with safety, for certainly such an honest people as the Yankees, will never think of adopting the tricks of the old countries. It is gratifying to be told that this establishment is expected to give a satisfactory remuneration both to its conductor and proprietor. Yet with these favorable prospects, it does not appear to me, that a sufficiently long trial has been had to determine the points at issue.

The account of J. H. Cobb, of Dedham, which appears to be made with exactness, gives a somewhat different result as to the cost of manufacturing sewing silk. He makes it, after detailing all the various processes, \$2,55 per pound ; and here no consideration is made for interest upon the stock, for superintendence, or for any commissions ; and undoubtedly, as in all such cases, there are a great many incidentals, which must somewhat increase the cost. We believe this gentleman was soon satisfied that this manufacture could not be carried on to advantage.

With respect to the introduction of silk manufactures, other

than sewings into the country, as long as foreign fabrics are admitted free from Europe, and from China paying only a small duty, it must be despaired of as matter of profit. The silk manufacturers in Europe, if we except the worms themselves, are the poorest fed and the poorest paid of almost any class of manufacturing operatives on the continent. In 1834, the prices of labor for weaving galoons $\frac{3}{4}$ wide, was one shilling one farthing sterling per groce; this would be a great day's work. At Huddersfield, where 13,000 persons, mostly females were employed, the wages averaged 2½d. per day. At Totmaston, where they worked 14 hours per day, men's labor was at one shilling sterling per day. In the county of Kent, 30,000 persons were employed in the silk business, at 6d. per day. The prices, it is presumed, have not since advanced. In Lyons, the wages of men in the silk business, is less than six shillings sterling per week, and of girls not more than three shillings per week. The salary of an overseer is about seventy-five cents per day. The wages in the silk districts in England, when the condition of the business is spoken of as prosperous, varies for an adult, from three shillings to eight shillings sterling per week; and as the article is matter of mere luxury, though of almost universal use, the fluctuations in their condition to which these poor creatures are subject, from the changes and caprices of fashion, often reduce them to extreme distress. We can easily suppose, that in some cases, they may wish they had the power of the humble insect, whose winding sheet they unravel, of enclosing themselves in a cocoon, from whence they might emerge with wings which should bear them away from their ill-requited toils and unpitied sufferings.

We cannot contemplate such facts without exulting with religious gratitude, in the superior compensation, and, in general, the extraordinary prosperity of labor, in our own country. But if we undertake the manufacture of silk, while trade is free, we must come in competition with such rates of labor. Is it to be supposed that we are ready for this? The benevolent mind would reluct at taking the bread from those mouths which get nothing, excepting bread, and scarcely enough of

that to keep their teeth bright, or their hearts from aching ; especially when our country offers to those who will work, fields of labor far more favorable to health, comfort, competence, and morals.

I am not disposed to enter upon any of the vexed questions of political economy. One great reason of the high price of labor among us is its scarcity, compared with the opportunities for its employment. This, to a considerable degree, is felt throughout the country. While as yet mechanical skill is so inventive and active ; such an infinite variety of arts and trades are put in constant requisition, and private and public improvements are every where advancing ; and especially while as yet the immense and fertile prairies of the unpeopled West, offer such powerful temptations to swarm from the parent hive, we ought not to lament that the manufacture of silk cannot advantageously be introduced among us. Certainly it need not be desired, until we ourselves produce the raw material in sufficient quantities to supply such establishments.

In discussing the expediency or inexpediency of introducing the manufacture of silk among us, I mean of course upon an extended scale, and not merely as a branch of household industry ; it is folly to overlook the differences in the condition of the people of this country and of the old world. Here the population is sparse ; there overflowing. Here it is difficult to find hands for the work ; there as difficult to find work for the hands. Here it is what will men do ; there, what can they do. Here in truth the laborer commands the employer ; there the employer commands the laborer, and takes him up or throws him off at his pleasure. The sun shines upon no spot of this earth, where, with reasonable desires, and virtuous habits, and moderate and healthful industry, the means not only of subsistence but of competence are more attainable than in our own Massachusetts. What occasion then for the introduction of a branch of business, the manufacture of an article of mere luxury, which, carried on in the old world with all the advantages of centuries of experience and the most improved machinery, has made the most meagre and uncertain returns to those who have performed the labor ! The Chinese are not surpassed in

the skill and beauty of their silk fabrics. Yet, I have it from the unquestionable testimony of a gentleman long a resident at Canton, that no class of manufacturers is to be found more severely tasked or more wretchedly sustained. The products of this labor therefore, unless prohibited by the government, must come into our markets at the very lowest prices.

That silk fabrics, being altogether an article of luxury, should pay a duty for revenue, would seem to be dictated by a wise policy, placing articles of necessity, which we cannot produce ourselves, for such tea and coffee have become almost as much as bread, within reach of the great mass of the people, burdened as little with expense as possible. To attempt by heavy impositions to prohibit silk fabrics, and so force the manufacture of silk among us, would be a mistaken policy. It would present in the first place, from the facilities of unlawful introduction, strong temptations to smuggling. It would withdraw from pursuits of primary importance labor that is now well applied, and direct it to a business, which, if it should pay well at first, would, just in proportion as the manufacture should become extended, decline in value.

We hear, continually, of the immense importations of silk into the country, involving us in a heavy debt to Europe. This creates an enormous drain upon the country, and is perfectly wasteful and prodigal. But would the production and manufacture of silk among ourselves, remedy this evil? If the persons, who mainly consume these articles, would themselves produce them, no one could doubt the immense saving and gain to the country. But who is insane enough to expect this? The persons, who must produce the silk, if it is produced at all, belong to that industrious portion of the community, who are now fully employed; and whose labor, if it is used at all in the manufacture of silk, must be abstracted from employments where it is now much needed. But as to those who merely flaunt in silks and satins, the children of mere luxury and fashion, the gay birds of paradise, we must be satisfied with the ornament and embellishment, which their graces and elegancies give to society, without expecting from them any more substantial contribution. Happy will the farmer be if

this spirit of luxury and indolence makes no inroads upon his own domains, and do not paralyze his own means of livelihood and success.

The increase of luxury among us, especially within a few years past, is most remarkable ; and I may be allowed to refer to it, as not without a powerful influence upon the agricultural community and interests. We hear great and constant complaints, of the vast sums of money which we send abroad, or of the debts we contract to foreign nations, for silk and other articles of mere luxury. I agree in reprobating, with all the emphasis that can be used, the folly and criminality of such conduct. But the mistake lies not in the introduction of silk more than in any other article of mere luxury. The folly and the criminality lie not in buying silk, but in buying any thing which we can live without, and running in debt for any thing which we have not the means of paying for ; and with the present habits of the community, are not likely to have the means of paying for.

The secret of much of the adversity of our condition, for it must be called adversity with nations as with individuals, whenever they are in debt and find it inconvenient, difficult, or impossible to pay, is our own neglect of production. Labor in some form or another is the creator of wealth. All wealth must come out of the earth or the sea. Credit is not wealth. Luxury and labor will seldom be found to subsist together. Luxury does nothing for its own support, but it is a parasitical plant, which, like the misletoe, draws its nourishment from that to which it attaches itself, always to the injury of the health, and too often to the destruction of the life of the tree on which it subsists. Luxury is a direct tax upon labor. It can be sustained only by the fruits of labor. Now what is the state of things among us, of which we hear so much complaint ? We are largely in debt to Europe. We are deeply involved at home. We have imported and consumed to an enormous amount, silks, laces, wines, artificial flowers, feathers, and gewgaws. Luxury of the most extravagant character has paralyzed

the arm of industry. We have been living, in a considerable degree, upon mere credit; for all currency which is not convertible into specie, or which does not represent specie, or otherwise available property of a productive character, or of a permanent value, is only credit. More than two-thirds of our population, including children and aged persons, idle young men, who do not earn the cigars which they smoke, and idle young women, who hardly mend, much less knit, their own stockings, and many of the professional classes and the trading classes, who, though to a certain extent, among the most useful in the community, and often among the most industrious yet are to be placed with the unproductive, produce nothing. Not more than one third of our population, this, indeed, is probably not an unfair estimate, can be considered as productive; and upon them devolves the necessity of supporting the rest. Now if the luxurious, or those who consume these articles of luxury, could be induced or compelled by their own labor to supply them, it would be indeed an immense saving to the country; and an immense gain in every way to the productive classes, whose labor, much of which now goes to pay for these luxuries, might then be determined into some more useful channel. But who can expect this? In the present condition of things nothing is less likely, and nothing will bring men to a sense, and what is of much more importance in the case, to the performance of their duty, but absolute necessity. The luxurious and spendthrift classes, who are the great consumers of these foreign luxuries, will not work; they will not produce the silks they wear. The production, then, if produced at all among us, must be from the laborious classes. 'There is, I admit, a large portion of labor which against its inclination is unavailable; or which would be applied if it could be profitably used. This I except, and of this I shall speak presently. The question then resolves itself into this. Shall our labor, now profitably occupied and in full demand through every part of New England, and where not even one tenth of our soil in Massachusetts is cultivated, and that which is cultivated not one fourth so

productive as it might be rendered, be diverted to the production and manufacture of an article of mere luxury? But suppose we should undertake and succeed in producing and manufacturing our own silks, so, as some lunatics imagine, not only to supply our own wants, but to make it a matter of large exportation. How are the luxurious to pay the producers here any better than they can pay the producers abroad? If the laboring and productive classes will be satisfied with a currency of which we have had too much, and we are to make money at our pleasure, and the luxurious and spendthrift classes can pay for their indulgences, and get on in their indolence and dissipation and wastefulness, with paying in borrowed notes, which in some parts of the country represent nothing but the promise to pay, written on the face of them, we can get along as we have done. But if, on the other hand, the experience we have had of the injustice, madness, and wickedness of such a course, has taught us any thing, we cannot get along as we have done. The laboring and productive classes will not remain satisfied that men should, at their pleasure have the means of expenditure and luxury, who do nothing towards earning or producing them; and they will require that that which passes as the representative of value, should not be a mere fiction, but in truth represent that which has a fixed, convertible, available, and permanent value, either in the form of specie or other real property.

The production and manufacture of silk among us beyond the availing of that kind of labor to which I shall presently refer, is not the remedy then for the evils of which we complain, the evils of involving ourselves in debt through the excessive consumption of foreign luxuries or even of home-grown or home-made luxuries. The evil consists in our using that which we have not earned; that which we do not pay for, and which we have not the means of paying for, and which we are not willing to labor that we may have the means of paying for. The production and manufacture of silk, unless it can be done by labor not now employed and yielding no profit, will not relieve us from our embarrassments. Indeed, try what art we will, there is only one effectual remedy,

and that is, the abandonment and disuse of these luxuries until we are able and have the means to pay for them ; or by honest and productive industry, acquiring the means to pay for them.

The notions, too, entertained by many, of our making raw silk an article of export, and of our undertaking to supply Great Britain and France at an enormous profit, with a large amount of the millions of pounds of raw silk which they consume, seem closely bordering upon visionary. We cannot, even had we produced a large surplus, come into the European market with our silk without coming in competition with the cheap labor of Italy, France, Germany, India and China. Besides this, the culture of silk, with the advantages of the improved varieties of mulberry, has made an auspicious beginning in the Sandwich Islands, and large contracts for trees, if report be true, have been made in the British West India Islands, where the climate admits of getting three to four crops per year. Now, under such circumstances, is it to be supposed that we can go largely into the cultivation of silk with any expectation of prices remaining as they are. There is another law of trade, which necessarily applies itself here. In the first production of some extraordinary article, it may command a high price ; or where by any peculiarity of location or any peculiar art or skill in cultivation, it can be produced with a degree of perfection, to which other persons or other places cannot attain, there a sort of monopoly may exist, and a high price be maintained. But an article of general production, and which may be grown to an unlimited extent, in almost an unlimited number of places will ordinarily bear a price proportioned to the cost of production and but little above it. If it fall below the cost of production, it will cease to be cultivated ; if it rise much above it and pay the large profits with which alone the imaginations of some men can be satisfied, an extended production, stimulated by this high price, will soon bring it down to its level. It is worse than idle to delude ourselves with false expectations. The laws which regulate the affairs of men, which are indeed none other than the laws of Divine Providence, and which extend to all the departments

of life, are fixed and unalterable. Like water, they never cease their movements until they find their level. To attempt to interfere with their operation, or to control them in order to meet our wishes, is like attempting to bend by our own force a strong tree to the ground. We may break it, and then we get a severe fall ; or its elasticity may presently cause it to rebound, and throw the person, who was thus trying his power, where he can make no further experiments. I am well aware that these views will not coincide with the popular sentiment ; but having no party predilections and no private views to answer, I am willing to submit them to the calm judgment of the intelligent and reflecting, and to the sober results of experience.

XIX.—RAW SILK. The production of raw silk, is, properly speaking, an agricultural operation. The inquiry whether this may be made profitable, concerns directly the agricultural interest ; and, under what circumstances it should be encouraged, is a question which I propose to consider.

It has been confidently stated, as I have already shown, that raw silk may be produced among us at current prices of labor, for two dollars or two dollars and a quarter per pound. In the cases referred to, however, no allowance was made for land, buildings, trees, manuring, and the superintendence of the proprietor ; but only for the actual labor applied ; and in Mr. Mc Lean's experiment, the labor of the man was rated at not more than half its customary value. In Mr. Smith's case not only were these items not charged, but likewise the board of the young women employed was not brought into the account. It seems to me then only fair to rate the cost of raw silk at three dollars or three dollars and fifty cents per lb. At 50 lbs. of silk to an acre, this would be a liberal compensation for labor ; and any increase of this product would be an increase of profit without a corresponding increase of the cost of production. But this again is making no allowance for accidents. With our inexperience in the silk culture in this country, we are not prepared to say what allowance should be made on this account. The worms are liable to various accidents. They are some-

times swept away by disease in vast numbers, to the sad disappointment and loss of the industrious cultivator. Hitherto, however, as far as my own knowledge extends, few such misfortunes have occurred. The profit upon the production of silk, must depend, of course, not merely upon the price of labor, but upon the value of the article in the market. This will of course again depend somewhat upon the supply. Any considerable increase of the product would, as I have attempted to show, inevitably reduce the value. Prices, too, are fluctuating, especially where there is a mixed currency; that is, a specie currency and a paper currency, which does not represent specie; and when promises to pay are interpreted and qualified at the pleasure of those who make them. No class in the community is more interested in a sound currency than those farmers, who are obliged to hire any labor, and are dependant upon the sales of their produce. The constitution of the country having fixed a standard of value in gold and silver, every other currency is sound so far as, and no farther than, it represents gold and silver. The defiance of their obligations, which has characterized some of the monied institutions of the country, and the persevering attempts in some parts of the country to uphold and force a purely paper currency upon the community, produce disastrous fluctuations; disturb all the sound calculations of honest industry; and in proportion to his means and concerns, the small farmer suffers as severely as those most extensively engaged in commercial pursuits. It is to the deluge of an irresponsible currency, which was by some institutions at one time poured out like water, that we must in a measure attribute those speculations in the *Muticulis mulberry*, which brought ruin upon thousands. Attracted by the glittering illusion of sudden wealth, like insects round an evening bonfire, they rushed into the flames, where many perished, or escaped with their legs burnt off or their wings singed, maimed and crippled for life. To the same cause we owe every where the interruption and desertion of the quiet pursuits of wholesome rural industry, for the hazardous, and in many cases the immoral pursuits of speculation.

Under these circumstances, whether we undertake to manufacture or to produce raw silk, we can at present make no very safe calculations for the future of what the price of labor will be ; or what will be the value of the article after it is produced. The attempt, therefore, to produce silk on any large scale, as well as the attempt to manufacture silk, even sewings, must at the present be an undertaking full of uncertainties, but one can hardly say, of doubtful result. The absence of all duties, upon foreign fabrics, exposes us, also, to all the caprices of foreign labor, capital, and cupidity, and the ebb and flood of foreign markets are felt equally upon our shores. Within the last few months, as I have remarked, the prices of many articles of silk have experienced a decline of more than fifty per cent. The best of sewing silk which not long since commanded nine dollars, now sells for six. Ribbons and lustrings are even much more reduced.

Some persons, on this subject of the profits of the silk culture, have had their imaginations raised almost to a white heat, and have thought that the product of raw silk in the northern states, might soon be made to equal the product of cotton in the southern portion of the Union. Certainly they do not mean in pounds, but in the value of the article produced. But is it not obvious that any such increase of the product of the article would proportionately reduce the price, though this would again be affected to a degree by another element, which must come into the calculation ; and that is, the increased use of the article which would follow any considerable reduction of its price. This would not, however, raise the price, because its free use depends on a low price, and bears a direct relation to the diminution of the price. There is, however, no sufficient reason to think that raw silk can maintain its present price in the country, certainly not in the face of any considerably increased production. The present price of raw silk from Smyrna is not much above \$4 per pound. Bengal silk is lower.

But our silk is said to be much superior to the India silk, as it is said, likewise, that silk raised in the northern provinces

of China is much superior to that in the south. I have not been able fully to satisfy myself of this fact ; nor, if true, can I ascertain whether it be attributable to the influence of the climate, or the superiority of the reeling ; but an intelligent manufacturer has stated to me, that, in his opinion, the Bengal silk would be found equal to any other but for the imperfection of its reeling. It is stated, likewise, on the most disinterested testimony, that the silk formerly raised in Georgia, whose climate, we know, is of a high temperature, was pronounced in England of an excellent quality. The perfection of the Italian silk is generally ascribed to the admirable manner in which it is reeled. It is at the same time, however, only just to state that the silk already produced among us, has fully demonstrated our capacity of producing as good an article as has as yet been seen.

In our calculations as to the price which silk is likely to maintain, we must take into consideration many new facts. The introduction of improved varieties of mulberry into Europe, and the great improvements which have been made in the engrafting of choice varieties upon the white mulberry, are not without their influence upon the silk culture, both in France and Italy. No longer ago than this very day, on which I pen this paragraph, I have received through a friend, direct information from one of the most distinguished agriculturists and horticulturists in France, of the introduction of a new species of mulberry from the northern parts of China, of a perfectly hardy character, furnishing an abundance of foliage, and promising, in its various good qualities, the most eminent advantages to the silk culturists of France. If the tree fulfils the promises, which are held out, it will soon be ours. It is said not to be propagated with as much facility as the Perottet mulberry, yet, it may be propagated without difficulty by engrafting. In the present condition of society, all monopoly of advantages or improvements, excepting those, which, from the nature of the case, cannot be transferred, are at an end. Continents are brought into near vicinity to each other. The papers come to us from Europe, scarcely dry from the press ; and the leaves of plants from the

gardens of the old world will hardly have time to wither, before they strike their roots anew into our own soil. This brings men into one common brotherhood; and what a delightful and mutual interchange of advantages will be continually extending itself, while the path over the hitherto trackless waters, is now easily marked out, as to the ancient Israelites, by a curling cloud by day and a pillar of fire by night; and a voyage which was of months, is now measured by days and hours.

The improvements likewise made in the management, or as it is professionally termed, the education of the silk worm, on the experimental silk establishment of M. Beauvais, to which I have already referred, and by which four harvests may be obtained in a year, and a larger yield from the number of worms fed than by any other process, will be extended, and produce their natural effects. It has occurred to me, likewise, that the culture of silk is likely to be increased in British India. Not an inconsiderable amount of persons in these provinces have been engaged in the production of opium, with a view to the Chinese market. If the noble effort of the Chinese sovereign to arrest this dreadful scourge, which has opened such a flood of misery upon his dominions, are to be successful, and a nation of barbarians are able to put a stop to the nefarious efforts of the agents of a nation calling itself Christian to force this deadly physical and moral poison into their veins; then the cultivation of this drug in British India, will be much abated; and why should not the labor of this population be turned into some other channel? Great Britain imports annually about 28,000 bales of raw silk of 162 lbs. each, or, in gross numbers, over three million and a half of pounds. Now, with the power, recently understood, of propagating the best varieties of the mulberry with a rapidity, which almost exceeds belief, and in a climate favorable to this kind of tree, where three harvests may be easily gathered in a year, why should not a portion of this population be turned to the cultivation of silk and cotton, with both which they are familiar? In the pre-

sent condition of society, who can calculate the changes which may occur?*

The cultivation of silk is making great advances in Germany. It was commenced many years ago, and then was suspended for nearly half a century; but the success of the culture in France has attracted attention strongly; and it is now pursued with great vigor and success. Indeed, it may be considered as greatly on the increase in all the countries of Europe, where the condition of the country admits of its cultivation, with the exception of those which have been for a long time the theatre of the tragic exhibitions and cruelties of civil war.

Under these circumstances, I see no very strong encouragement for the erection of large establishments either for the manufacture or the production of silk. The country, indeed, has neither the experience, which is desirable in such case, nor labor enough to manage them to advantage. We have not the population to fill them, and are not likely to have for some years to come in New England. In what country does the price of labor bear a comparison with the price of labor among ourselves? Such establishments are in no respect to be desired; and are likely to fail from the extent and complexity of the business. When men talk about feeding several millions of worms in a year, they are in danger of deceiving themselves in regard to the amount

* "To show in a most instructive manner the changes which may occur under the active progress of improvement in the civilized world, of which indeed, we may have our full share of advantage as well as others, and which no people can monopolize to the exclusion of others, I refer to the changes, which have taken place in the manufacture of lace. This should at least admonish us that all mechanical ingenuity is not confined to ourselves.

"Such has been the progress of improvement and economy in this manufacture, that the cost of labor in making a *rack*, which was twenty years ago, 3s. 6d., or 42 pence, is now not more than one penny. The prices of this beautiful fabric have fallen in an equally remarkable manner. At the former periods, a 24 rack piece, five quarters broad, fetched 17l. sterling, in the wholesale market; the same is now sold for 7s."—*Ure on Manufactures*, p. 733.

of labor required ; or these calculations are too often the stratagems of purely interested persons, who have only some private ends to accomplish, and are for inducing others to beat the bush that they may catch the bird. A highly enterprising and industrious cultivator told me, two years since, that the ensuing year he designed to make 5000 lbs. of raw silk. He certainly had no intention to deceive, and I believe deluded no person of sound mind but himself. The year passed on, but not 50 lbs. were made. He has since somewhat modified his expectations, and calculates this year upon making 2000 lbs. When the silk comes to be weighed, we can best determine the fulfilment of the prediction. Most certainly I should rejoice in such splendid results of domestic industry, if labor can be thus applied to advantage ; but with the liberal bounties of the state, offering two dollars a pound upon reeled and thrown silk, sufficient as has been confidently stated to cover the entire cost of production, we have not yet reached in the whole State one quarter of that product in a year. This dreaming with our eyes open is prejudicial to the substantial and permanent success of any good enterprise. Successive disappointments and losses, almost inevitable under such circumstances, produce universal discouragement ; create disgust ; and throw back the cause, which occasions them, almost as far beyond its true position as the expectations of its friends had placed it in advance. The largest amount, as far as I can ascertain, ever made by any individual in the country, in any one year, was made by William Atwood, of Mansfield, Conn. This was one hundred and eight pounds. Such an amount has rarely been approached by any other person.

The attempts made to force the silk culture by legislative encouragement, bounties, and penalties, in Georgia, Virginia, and Connecticut, in former years, though urged by the same eloquent arguments by which its friends now commend it, proved utter failures. The country was not then, and it is not now, prepared to go into the cultivation of silk upon that extended scale to which the imaginations of some men, whose

good intentions and public spirit I do not doubt, would carry it. I should anticipate the same results, which followed in former cases, from any extravagant attempts to force its production at the present time.

It is said that the silk culture in France yields a profit of 20 to 40 per cent. But from the condition of things in France, we can predicate nothing of our own community. When we can obtain men's labor for \$1,25 per week, and women's labor for sixty cents, and children's labor for a few sous and the laborers provide for themselves, and can be sure of obtaining the high prices, which silk now commands, there is no doubt that we could produce and manufacture silk to equal advantage with any nation. But let the profits be as they are described to be in these countries, who gets these profits? Not the growers of the silk; not the operatives in these establishments; but the owners of these large filatures and manufactories. They skim the cream; the producers of the silk, the operatives in these foreign manufactories, the living machines, they must be satisfied with the skim-milk, and that oftentimes somewhat diluted. It is not so, let us thank God, with us. Labor is not so abundant with us, that it cannot command a full compensation; nor as in the crowded manufactories of Europe, that it surrenders all claims to the perfected article, though perfected by its own toil, and is satisfied with the ends and the waste. In our favored country, manufacturing labor has been most liberally compensated. But it is said that our people do much more in a day than the laboring classes in Europe. If the labor consists mainly in attendance upon machinery, there can be no great difference, where the same number of hours is given. In Lyons, the silk manufacturers work 14 hours per day, exclusive of meals. In other cases of labor, the operatives or European laborers, do less because they are paid less, and miserably fed and housed. If we get more performed by an equal number of hands, the cost of this labor is increased in proportion. But it is said that we have superior advantages to counterbalance the comparative dearness of our labor, in what we are pleased to call Yankee ingenuity and contrivance. We should be led to infer from the style of speaking adopted, and too current among us, that no other people

on the globe ever had any ingenuity or contrivance, but ourselves. This comes of our ignorance and self-conceit. It is time we cultivated more a just self-respect, and abandoned a habit disreputable and offensive. We may boast indeed of a Franklin, a Whitney, a Fulton and a Perkins; and so may other nations boast of an Arkwright, a Watts, a Wedgewood, a Babbage, a Fisher,* and a Jacquard. These men belong to no geographical location. Such minds are the common property of human nature. The curious invention in 1830, of the loom, which bears the name of its inventor, M. Jacquard, of Lyons, constitutes one of the most important steps that has ever been taken in the silk manufacture, and the manufacture of other figured goods. Its ingenious mechanism, is not often rivalled, and scarcely exceeded in any country. But with all our ingenuity and contrivance, how far are we at present from being able to produce the exquisite and beautiful fabrics of civilized Europe, or even of barbarous China and Japan.

We are often admonished of the enormous amounts expended for the introduction of silks into the country. During the prevalence of that terrible epidemic, which prevailed throughout the country in the year 1836, the speculating brain fever, our imports of silk rose to the extraordinary amount of \$22,000,000; some years they have reached to \$12,000,000 and \$13,000,000, but ordinarily, they may be set down as from \$7,000,000 to \$9,000,000. If silks were an absolute necessary of life, we ought, by all means, to be able to produce them, as otherwise, we might under contingencies, suffer through want of them. But as matter of mere luxury, though a useful luxury, there are not the same strong reasons for urging the culture and manufacture of silk against so many disadvantages. Should the government see fit to afford such a protection as the cultivators of silk might desire for their purposes, this would be a

* "Bobbinet may be said to surpass every other branch of human industry in the complex ingenuity of its machinery; one of Fisher's spotting frames being as much beyond the most curious chronometer, in multiplicity of mechanical device, as that is beyond a common roasting-jack."—*Ure on Manufactures*, p. 730.

hindrance to its manufacture. Should they, on the other hand, attempt by high duties, to protect the manufacture of silk, they must leave the admission of raw silk free, which would proportionately discourage the cultivation. A system of utter prohibition of foreign silk, or foreign silk goods, would be likely to result no better than did the same system of prohibition and monopoly, which was pursued in Great Britain for a very long period of years. It would enhance the price, but diminish the consumption. It would check enterprise and ingenuity in the improvement and the manufacture. It would tend to divert much labor into new channels of industry without any corresponding advantage. So far from putting a stop to smuggling, the temptation to the illicit introduction of silk would be vastly increased.

To the laying of a reasonable duty upon imported silk, whether raw or manufactured, for revenue, there can be no sound objection. Silk being wholly a luxury is a fit subject of tax, as the tax must of course fall upon those who are best able to pay it. But beyond this, any legislative enactments with a view to force its culture here, would be met by attempts to defeat or evade the law, which in such an article as silk in any form, from the small space which it occupies in proportion to its value, would be but too successful. As I have already remarked, the exorbitant duty of thirty-six, or forty per cent. as it was a short time since, upon sewings, has served not to benefit our own manufacture, but rather materially to injure the sale of the article, by the inducements offered, and the consequent illegal introduction of the foreign article.

XX.—CALCULATIONS RESPECTING SILK PRODUCTS.—I am aware that I oppose the popular opinion in speaking thus discouragingly of the manufacture of silk in our country. It would be more agreeable to float with the tide than to struggle against it; but whether the opinion of an individual be of little or much weight in the community, he is bound to respect his own judgment, and is at liberty to utter only his honest convic-

tions. Public sentiment and public actions can be affected but in a slight degree by the opinions of any individual ; and addressing one's self to intelligent and reflecting minds, no evil can result from the freest discussion. No good will come from creating false expectations ; and I should be glad to disabuse the public mind of some of the gross illusions by which it has been willingly imposed upon. In some of the documents before me, and those published under authority, it has been confidently stated, that an acre of land planted with mulberry trees, may be expected to produce the first year one hundred pounds of silk, and afterwards be increased to 333 lbs., and even to 666 lbs. ; and that the profits of such cultivation would be \$1170 per acre. Another person goes on to calculate that one hundred acres even at 180 lbs. to the acre, and silk at 4 dollars per lb., might be made to afford an income of \$72,000. At present these must be considered as mere dreams. If this be practicable, why has it not been done ? There has been ample time in other countries, and in this country, to have done it, if it could be done. There have been trees enough, and land enough, and capital enough ; and in some of the states a bounty has been offered for some years on the production of silk, admitted by the most ardent friends of the cultivation, to be sufficient to cover the whole expense of production. In what country, at what time, was ever such encouragement to production held out before ? But no such returns have been obtained or even approached ; and with the exception of Mr. Atwood, before referred to, and Miss Rapp, at Economy, who, until new claimants appear, must be allowed the rank of queen of this branch of domestic industry, it would be difficult, I imagine, to find half a dozen individuals in the whole Union who have produced, either of them in one year, one hundred pounds of silk. I myself know not of one. I should have been glad of the honor of recording the names of hundreds who had accomplished it, if they were to be found. Mr. McLean, who has approached more nearly than any other man in the country towards determining what can well be done, admits, with

the most creditable frankness, that he despairs of ever seeing 104 or 128 lbs. of silk produced upon an acre. I cannot say with him, that I despair of such a result ; but I shall wait for further trials before I am prepared to say, with confidence, that more can be done than what his remarkable intelligence, skill, and enterprise have effected. In respect to the actual cost of producing silk, that as yet is by no means settled. Mr. Mc Lean's experiment, which has come the nearest to determining this matter with exactness, is, as I have shown, far from doing it. First, he made no allowance for land, trees, rent of buildings, cultivation and superintendence. Second, he charged the man's labor and board at half the price, three dolls. per week, which it would cost with us. Third, he states distinctly, that *his* silk cost him much more than two dollars a pound, though he thinks it may be produced for this sum ; that is, as I understand it, the mere labor of producing it can be paid for by that sum, in his judgment.

XXI.—MANUFACTURE OF SILK.—With respect to the manufacture of silk, except in a small way, the attempt in New England, thus far, must be pronounced a failure. It has been followed by loss and bankruptcy in almost every instance where it has been undertaken. Unless the government should utterly prohibit its importation, it cannot be otherwise ; and if the government should attempt this, and nothing is less likely, the rise in the price would product only new efforts for its illicit introduction, which, as remarked, with an article admitting of so easy concealment as silk, would not be difficult, in a country accessible at so many points as ours. But would the introduction of the silk manufacture among us be desirable ? I think not, in the present condition of our population. The manufacturers of silk in Great Britain, and on the continent, are wretchedly paid and wretchedly fed. Whatever wealth may have been accumulated, or whatever success may have attended the operations of the proprietors of these silk establishments, the wretched

men, women, and children, who perform the labor, have little more than sufficient to sustain life. In a business so liable to be suddenly and deeply affected by the caprices of fashion, they are exposed to the most painful revulsions, and are often reduced to the extremes of want and misery. Can we desire to see any of our own population placed in the same condition? Yet how otherwise can we come in competition with this foreign population in an article of this sort? Nothing can be more absurd than to suppose, that if the country were to go largely either into the manufacture or production of silk, as is proposed by some persons, that present prices could be maintained. In countries, where men are trained in particular departments of labor from their childhood, without any expectation or any practicability of a change, a different state of things exists from that which exists among us. Here, men at their pleasure can change, and are perpetually changing their condition. Here, excepting those pernicious influences, which result from a disturbed currency, and an uncertain standard of value, the relations of labor and its compensation in the various employments of industry will be continually seeking a level, and maintain a uniform proportion. If any particular branch of business promises extraordinary profits, and by extraordinary, I mean a larger compensation for labor than other employments afford, men will rush into that, until its profits are equalized with those of other pursuits.

I am not an enemy to manufactures ; very far otherwise ; but I believe no sagacious mind can doubt, that with a sound currency any considerable extension of them among us must tend to reduce the wages of manufacturing labor. In our condition of population, I have not been able to perceive the direct benefits of manufactures to our agriculture, excepting as far as they increase the productive capital of the country, from the manufacture of any article among us. the raw material of which we do not produce ourselves. If this capital were directly applied to the extension and improvement of our agriculture, the benefits would be obvious ; but this has been the case to a very small extent ;

and, in one respect, manufactures, by withdrawing a large portion of labor from our farms, and by the high wages, which by the amounts of artificial capital existing among us the manufacturers have been able to pay, have tended rather to the discouragement of agriculture in the State than to its extension. I do not mean that our agricultural interest has been depressed ; but so large a portion of our population have turned their attention to manufactures, that our population and even many of our farmers have depended upon foreign sources, other states and other countries, for the supply even of the first necessities of life ; and cultivation and improvement have been narrowed rather than extended.

With our present population, a larger proportion are now occupied in manufacturing pursuits than can be spared from agriculture, without injury to its interests ; and as, in the present state of things, is for the interest of the manufactures themselves. Our cotton manufactures certainly do not desire their extension. Our woollen manufactures cannot get on without a reduction of the price of labor with which the laborers are not satisfied, or of the price of wool with which the farmers are not satisfied. Why, under these circumstances, should we wish to see the manufacture of silk introduced—an article, in a great measure, of mere luxury.

XXII. MANUFACTURES IN ENGLAND.—But the prosperity of England, we are constantly told, has been based upon her manufactures. It will not be questioned, that they have been to her the source of immense wealth. But who has had this wealth ? Who has been benefited by this signal prosperity ? Not the laborers themselves, whose toil has created it. 'They have seen the mountains of wealth rising up among them ; and they have brought their contributions to increase these masses in the hands of the great proprietors ; but they themselves have scarcely been permitted to reserve from the products of their own toil the means of sustaining life. Broken down with excessive toil they have been crushed between two mill-stones, low prices for labor on the one hand, and high

prices of bread on the other ; for in an artificial system like theirs, the agricultural interest claims protection as well as the manufacturing ; and corn laws must be maintained, the hardships of which fall almost exclusively upon the laboring classes. Under such circumstances, the only sovereign remedy against the complaints of their starving crowds has been bayonets and balls. Now with all her wealth and all her machinery, and all her magnificence, where, all circumstances considered, where on earth exists a more wretched, miserable, vicious, squalid population than are to be found among a large portion of the manufacturing population of Great Britain? We may add likewise the silk manufacturers of Lyons. Who would desire to see a standard of wages introduced among us like that which prevails in England or among the manufacturers on the continent? Hitherto among us, for various reasons, which it is not necessary to discuss, and especially from our sparse population, from the demands for labor made from other sources, and from the cheapness of land, manufacturing labor has been most liberally and sometimes exorbitantly paid. But in proportion as manufactures are extended among us, unless under a high tariff, amounting almost to a prohibition, the standard of wages must be in some measure conformed to that of Europe. It is idle to think of introducing the manufacture of silk unless we can produce it at the rates of labor which are paid there.

XXIII. OUR OWN CONDITION.—But how are we to pay for the silks which we import from Europe? We cannot honestly pay for them. We ought not to use them. In our present condition we have no right to them. The enormous extravagance and luxury which have prevailed among us, have occasioned the bankruptcies and the distresses, and many of the flagrant crimes which darken the history of our community for the few past years. But cannot we make them ourselves? As I have already said, the luxurious and spendthrift classes might do it, if they would ; but no one expects this of them. But may not much of the labor, which is now applied to other purposes

be withdrawn from them and applied to the exclusive production and manufacture of silk? Not without taking it from more important objects; and not without consenting to much lower prices for labor than we now receive.

But may not the production of raw silk be made profitable among us? I think it may. I recommend its introduction and culture; and I will show under what circumstances it may be pursued to advantage. But let me first premise that I have no confidence in any such enormous products and profits as have been predicted. I believe, under some circumstances, it will pay not only a fair, but a liberal compensation for labor. With this, we ought to be satisfied. I believe that more than fifty pounds of silk to an acre, can be produced, but I shall assume this amount as a safe basis of calculation, because this has actually been accomplished. I will suppose, likewise, in the calculation, that by the increased product of silk, a price is obtained for it barely sufficient to cover the expenses of production. It is often asked, whether, if we should go to producing raw silk, we should be able to find a market for it? This cannot be doubted, provided we are willing to sell as cheaply as other producers. The raw silk produced among us is universally admitted to be of a superior quality. We shall go into the market of the world, then, with this advantage; but we must come in competition with other growers of silk; and take such a price as the market offers. What this may be there are no means of determining. The demand for raw silk is not unlimited, but the use of the article is gradually increasing; and in proportion to its increased production and consequent cheapness, the demand may be expected farther to increase. It has one advantage, which is not to be overlooked. It is an imperishable article; and the sale of it, other circumstances being favorable, may always be discretionary; and it may be kept without other loss than that of interest on the cost for a good price.

XXIV. PRODUCTION OF SILK IN MASSACHUSETTS.—Under what circumstances, then, may the silk culture be urged upon

the farmers of Massachusetts. There is, then, in the first place, no difficulty in raising the hardy kinds of mulberry in any part of the State. There is good reason to believe, that the tender varieties may be naturalized ; and they may at least be cultivated to a certain extent, by taking them up in the fall and resetting them in the spring. Every farmer, therefore, in the State may have, at a small expense, his one, two, three, or more acres of mulberry trees, the leaves of which he may use as he pleases. A permanent plantation being once well established, it will require little care to keep it in good order, and the trees will endure for several generations. If he does not choose to use the leaves himself, there may be a market for them with those who are willing to use them. In France, the leaves are picked and carried into market for sale, as much as other vegetables. As in Mansfield, persons may be found, who will be willing to take the trees and eggs, upon condition of returning a third or two-thirds of the product in silk, as may be agreed upon. In this way the cost of the trees and the expense of setting and cultivating them will prove a profitable investment. Further, the trees may be planted at the road sides as ornamental trees, occupying no land to the disadvantage of any other purpose ; and in this way may be made productive. The planting of the trees, therefore, the white, the broussa, the Alpine, or Sharpe's variety, ought every where to be undertaken and encouraged ; and the tender varieties demand the particular attention of persons, who have the means of cultivating and using them. A mulberry orchard ought to be found upon a farm as constantly as an apple orchard.

The expense of other fixtures need not be much. Though undoubtedly the most perfect way of pursuing the business is the best way, and, as we see illustrated in the mode of treatment adopted by M. Camille Beauvais, which I shall give at large, effects a great saving of time and labor, and a larger amount of produce, than by what is called the natural method ; yet the business may be pursued advantageously, because it has for years been pursued advantageously in Mansfield, with-

out any expensive fixtures. Vacant rooms in the house, vacant sheds or portions of the barn may serve as a cocoonery, or as the French often call it, a magnanerie or feeding house ; and though artificial heat and an equable temperature to the cocoonery are desirable in order to the most perfect results, yet no such processes have ever prevailed in Mansfield, and therefore are not indispensable to a fair product. A cocoonery may be built upon a farm at a small expense, which may serve the double purpose of a feeding house for the worms and a granary. Mr. Haskell, of Harvard, has erected a building of this description, which is well contrived and not expensive. The dimensions of such a building may be forty feet by twenty, two stories in height, with a cellar under the whole ; and the farmer will find it useful for various purposes.

XXV. LABOR APPLICABLE TO THE SILK CULTURE.—Having the trees and the buildings, there remains only the labor to be applied. Now in almost every farmer's family in the country, there is considerable labor, which is comparatively unavailable. There are persons advanced in life, who have passed the season of severe labor. There are children, whose services might be made productive. There are young women, who cannot, or who, from filial duty or various considerations, are unwilling, to leave the paternal roof. There are many, who are averse to go out to service, and equally averse to go into a factory at a distance from home. There are many young women occupying a standing in society which, in the present condition of public manners, a condition which we cannot alter or transcend at our pleasure, necessarily shuts them out from various employments, of which otherwise they might avail themselves to aid in their own support ; who are now comparatively without occupation, and whose necessary expenses it may be difficult for them and their parents to meet. Public opinion or fashion, is a despotic tyrant, whose rule is sovereign and inexorable. It must be considered likewise, that the introduction of machinery, the use of water power, and the large cot-

ton and woollen establishments raised up in different parts of the State, have entirely destroyed what may properly be called household industry. Even the humble knitting-needle, is in many cases, completely displaced by machinery. We complain that the music of the spinning-wheel, and the flying of the shuttle are no longer heard in our farm houses. We cannot expect it to be otherwise. This is not because our women are not as much disposed to be as industrious as their grandmothers, but because, in truth, it would be almost folly to contend by the ancient arts against the modern processess of manufacture. Then again, for want of this opportunity of domestic labor, thousands and thousands of our young women, forsake the parental hearth, and fly in crowds to our cities, to seek employment in the various trades and arts which are there practised ; and, where unprotected and removed from the restraints of parental care, amidst the dreadful perils which surround them, they but too often find the grave of their honor and virtue : to themselves, and to those, whom they leave behind, a more dreadful sacrifice than that of life. To all these descriptions of persons, the culture and reeling of silk may furnish a necessary, easy, respectable, and profitable employment. Many a small farmer in the State, without difficulty, without expensive investments, without using any but the services of his own family, and without, in any measure, interfering with, or deranging his farming operations, may, under proper arrangements, produce his fifty, hundred, or two hundred pounds of raw silk per year. This, even at two and a half or three dollars per pound, a price below which it is not likely to fall, would afford a convenient and agreeable addition to his income. This seems to be entirely practicable. Here the calculations are all closely restricted ; and founded not upon conjecture, but upon actual experience and determined results. This supplies a want, which is deeply felt throughout the country ; and opens views most grateful to the philanthropic mind. In Italy and France, as I am informed, the production and reeling of silk, are almost wholly conducted in this domestic way. The ag-

gregate amount in such a case throughout the State, would be immense ; and this all obtained without any expensive advances or any great risks, or any labor, but that which is now comparatively unproductive and otherwise unavailable. It may be considered in such case, as almost a clear gain ; and whether it pays as well for labor, as other branches of agricultural or manufacturing pursuit or not, is of little consideration, compared with the fact, that it pays something and a reasonable compensation, where otherwise nothing would be obtained.

XXXII. SILK CULTURE FOR THE CLERGY.—1. There is another class of persons, to whom the culture of silk would afford peculiar advantages, and prove in no way inappropriate to their condition, or inconsistent with their duties ; I mean the clergy. Every intelligent person, acquainted by experience and intercourse with society in New England, especially in its rural departments, knows what an invaluable blessing, viewed merely in a social aspect, this order of men together with the religious institutions, which rise or fall in a measure as they rise or fall, have proved to the community ; and how much it is indebted to them for the good order, the good manners, and the highly improved condition which distinguish it. But that the ministry may be useful, it must be, in a degree, independent ; and that, at the same time, it may retain its hold upon the community, it must not be felt to be burdensome. In the present condition of society, nothing has become more precarious than the tenure of the ministerial relation ; and nothing more discouraging in the discharge of their responsible duties, than the state of dependance upon public caprice, not to say public charity, in which they are now placed. To a truly pious and benevolent mind, it will be always grateful and delightful to dispense the gospel, as far as possible, without charge ; and, if an apostle, that he might do this, served at his trade of tent-maker, a good minister will esteem it a privilege to be able, where it can be done without interfering with his professional duties and improvement, to supply, in a measure, by his own

manual exertions, his own and the wants of his family. To a clergyman, then, in the retirement of the country, living upon the uncertain, scanty, and too often begrudged support, which is allowed him, what a valuable resource may the cultivation and care of this invaluable insect afford.—By the labor of a few weeks in a year, and then only a part of the day, he may, with the aid of an industrious family, procure by his honest exertions, a sum perhaps equal to that which his people feel able to afford; and thus obtain for himself, the means of many an innocent indulgence; perhaps too, of educating his children, and of providing for a dependant family, a comfortable subsistence in the event of his removal or death. I hope, my brethren of the clergy, will not consider these suggestions as in any measure disrespectful. They are dictated by a feeling, totally opposite to this. I should be the last to recommend to them the silk culture or any other business, as matter of mere pecuniary gain, but only on the ground of a just regard for their own comfort and that of their families. A little knowledge of human nature, will convince them that their people will be always the more ready to help them, as they find them able and ready to help themselves. The clergy, from the earliest times, have been the pioneers in agricultural improvements in our country; and among a rural population, I know not how, in a secular view, a minister can render a higher service to his people, or make a stronger claim upon their respect and gratitude, than by promoting among them the study of the natural sciences, the exercise of the mechanic arts, and giving them an example of sound domestic economy, and frugal, intelligent, skilful, and improved husbandry. There are too many such laudable examples within my own knowledge, to allow me to doubt that this may be done without in any measure interfering with his own intellectual improvement and the most conscientious, faithful, and useful discharge of his sacred duties.*

2. FOR PAUPER ESTABLISHMENTS.—I cannot doubt, likewise, that the culture of silk may be introduced with advantage into

many of our pauper establishments, where farms are connected with them. Here, often, there is a great deal of light labor available, which it is difficult and impossible to apply to advantage in the common field operations of agriculture, and which, now applied to the picking of oakum or to knitting, amounts to little. This labor, under judicious superintendence, might be advantageously applied to the production of silk.

3. **FOR THE SHAKERS.**—I take particular pleasure in recommending the culture of silk to my respected friends the Shakers. They have every element of success; intelligence, skill, exactness, perseverance, abundance of labor, land enough; and buildings already prepared for their operations. They, of any among us, would be the fittest persons to undertake the artificial method of M. Camille Beauvais. Their female aid is of the best description for this culture. They may pursue it to any desirable extent; and I cannot have a doubt, if they should undertake it with their usual care and determination, their enterprise would be crowned with success.

4. **FOR SCHOOLS.**—Attempts have been made in different parts of New England, to get up manual labor schools; that is, schools designed to aid poor young men and women in getting an education, by making their expenses light, and allowing them to defray a portion of these expenses, by some labor, rendered daily or occasionally, either in a work-shop, or a farm attached to the institution. This is a benevolent design. That it has not hitherto succeeded as well as could be wished, is not the fault of the scheme, but comes from improper management. Into such an institution, the silk culture may be introduced with singular advantage, if pains are taken previously, to have a sufficiency of food for the worms. The labor would be light. It would occupy, excepting for two or three weeks, a small amount of time. It may be expected to yield as fair returns as any branch of agriculture, which could be connected with such an institution. It may, under some circumstances, be favorably introduced into other schools. The occupation would prove as conducive to the intellectual and moral as to the physical health. The study of nature, in all her departments, is

among the most interesting and valuable of all pursuits to the young mind. Every thing that brings the young more immediately into connexion with other living beings, and especially makes demands upon their prudence, providence and kindness becomes at once an effectual teacher of the most practical, the most valuable, and the highest virtues.

XXXIII. CONCLUSION.—I have, as will be seen, mainly confined myself to the discussion of the silk culture in Massachusetts, and with our present knowledge of the business, and our present prices of labor. Under how much more favorable circumstances it may be pursued where slave labor abounds, where the climate admits of obtaining three or four harvests a year, and where the best trees require no care nor labor to protect them in winter, I shall leave others to determine. How well adapted this product must be to those farmers, whose situation is remote from market, and with whom the common agricultural products are too heavy to be transported, but with great loss and toil; how advantageously it might be substituted for that odious plant tobacco, which is an impoverisher of the earth as well as a poisoner of man, and which holds the miserable pre-eminence of standing next to that curse of curses, intoxicating drinks, it is not necessary for me to say. How much more productive it may hereafter prove than we have at present any certain grounds for calculating, will presently be determined; and I entertain the sanguine hope, under an improved cultivation, of a greatly increased yield.*

If under the circumstances which I have stated, and under the qualifications named, it can be introduced and extended in Massachusetts, not as a principal, but as a collateral and incidental branch of husbandry and domestic industry, it must prove a source of eminent comfort and wealth. That the machinery for reeling is simple and cheap, that the operation involves no mystery, and may be learnt and performed by a child, are other circumstances which commend it. Massachusetts, then, I cannot but hope, will see in this case both her interest and duty. As she increases her productions

* Appendix W.

and her wealth, she increases her real power ; strengthens the attachments of her children to their home, and abates the desire of emigration. In introducing this article, so emphatically of domestic and household industry, she multiplies the sources of domestic comfort and competence ; and affords no small nor inefficient contribution to the cause of good morals and philanthropy.

I should do injustice to my own sense of grateful duty, if I did not call the attention of my readers to the miracles of divine Providence in this wonderful animal, the silk worm ; at his entrance into life, among the smallest of living existences, which come within the cognizance of our senses ; in six weeks, at farthest, completing his work ; and by his humble and unobtrusive labors, contributing largely to the clothing of half mankind, and creating yearly millions and millions of wealth. It would be curious to calculate the hands he fills, the mouths he feeds, the wheels he sets in motion, the ships he loads, and the vast riches to which his annual labors amount. This reads a striking lesson to the reflecting mind, on the immense results which spring from regular and combined, though minute and often a disdained labor. Nor are his changes the less extraordinary or striking to the thoughtful mind. Nature is every where full of mysterious transformations, which show that the power of death has its limits, and indicate the wonderful progress of animated existence. Having accomplished his appointed task, he wraps himself in his silken shroud, and with him death is only a transient sleep. If left to himself, he soon emerges from his tomb, no longer a reptile, but a winged chrysalis, to enjoy another existence. In the curious transformations of this humble insect, man may see an instructive indication and testimony of the progress of being ; and a proof that death is not annihilation. May we, as men, exult in the hopes, gathered from such beautiful examples in nature, and confirmed by divine revelation, that with man also, death is only the threshold of life ; and that for him to burst these cearments of the grave, is not like the silk worm, to pass rapidly through another form of being, but to enter upon an immortality.

APPENDIX.

A.

ANNUAL IMPORTS OF BREAD STUFFS.

“It is ascertained that the flour imported into Boston in one year, amounted to 418,000 barrels, and corn with other bread stuffs to 2,000,000 bushels. This quantity is the average annual amount imported into Boston for three successive years, by an accurate abstract from the documents. To this quantity must be added one third for the outports, which is a low estimate. At the price of \$7 75 for flour, and 80 cents per bushel for corn; it would amount to \$6,453,333 paid by the State in a single year. This was for the year 1836. The importations were larger in 1837; and at the prices then paid of \$11 per barrel for flour, and one dollar per bushel for corn, with the addition of one third for the outports, the amount would be \$8,797,338 paid for bread stuffs in that year. The western parts of the State are supplied directly from Albany, and the towns upon Connecticut river by way of Hartford. We may, therefore, estimate the sum paid by two thirds of the population of the State, in a single year, at nearly nine millions of dollars.”

The imports of flour into Boston in 1839 was 449,068 barrels, and of corn 1,607,492 bushels.

B.

ON SOWING WHEAT IN DRILLS OR BROADCAST.

I subjoin here some extracts from an account of an experiment on the difference between drilled wheat and wheat sown broadcast, given in Hunter's Georgical Essays, vol. iii. p. 528:

“On the 12th October, the land was measured and equally divided;

on the 14th, began to sow broadcast, under furrow, with the usual quantity of this county, viz. two bushels and a half per acre; (our bushel is eight gallons and three quarts measure,) on the 15th, finished the broadcast; the two following days the six acres intended to be drilled, were ploughed, in order to give both an equal quantity of work, into lands nine feet six inches wide, a proper width for Cook's drill; and drilled accordingly a few days after, with one bushel per acre of the same measure as above. To do the drill justice, I must observe that the young plants suffered very much from the rooks picking the grain out of the drill, which left the land so thin of plants that some of my neighbors went so far as to say I should have no crop. It was, also, I believe, injured one acre in six by a leading land ditch stopping, which overflowed that part of the field with water for some time, and being directly across the headlands, hindered me from scarifying as soon as I should have done.

During the winter the broadcast had by a great deal the best appearance; but in a little time, after the drilled wheat was scarified, which was done the second week in March, it evidently got the lead, being then of a darker green and more healthy color. In April, the drilled wheat was horse-hoed; at the same time the broadcast wheat was hand-hoed; and in May the drilled wheat was hand-hoed, as at that time I had not a horse-hoe of my own, nor could I at that time borrow one. The drilled now beat the broadcast much. It tillered well. I told from twenty to thirty stems from a single plant, with wonderful ears, containing from twenty to one hundred kernels in an ear. The broadcast became ripe first; but both were cut at the same time; that is, the same men cut the drilled immediately after it. The broad-cast was carted two days before the drilled; but both were got without any rain, and laid in the same barn with a layer of drag-rakings between them, in order to thresh them separately. Both crops were threshed by the same man with great exactness. The produce of the six acres drilled, was twenty-five quarters six bushels; the produce of the broad-cast, twenty-four quarters one bushel and a half. Produce of the drilled per acre, thirty-four bushels one peck and four quarts; produce of the broadcast per acre, was thirty-two bushels one peck; that is, two bushels and one quart in favor of the drilled, which with one bushel and a half of seed saved, is three bushels and a half and four quarts in favor of the drill.

This, though considerable, is but trifling compared with the benefit the land has received from being scarified and horse-hoed, which was

very visible when the crops were cut, the drilled stubble being very clean, and the broad-cast foul. I am decidedly of opinion that if I had not hoed the broadcast, and if the drilled had not suffered by the rooks, and by being overflowed with water as mentioned, the drill would have beat the broad-cast at least one fourth part."

I add an interesting experiment of much more recent date, on narrow and wide drilling of wheat, which the intelligent inquirer will find highly interesting.

"*Trial of narrow and wide drilling of wheat on the 15th October, 1838.*—The quantity of land drilled, was 7 roods and 27 poles, half of which was drilled with 13 rows on a stitch 10 feet wide; the other half with 19 rows on the stitch, the land being divided into 4 stitches.

The same quantity of seed was used at the rate of 3 bushels per acre which produced from the

		Bushels.	Pecks.		Stones.	Lbs.
19 rows	348 sheaves	23	1 $\frac{3}{4}$	weighing net	106	8
13 "	374 "	21	0 $\frac{3}{4}$	"	96	8
	Bushels,	2	1	Stones,	10	0

The 4 stitches were along side of each other, and were all cut by the same men; and no perceptible difference in the size of the sheaves. The 13 rows did not stand so well as the 19 rows; but were a shade the better sample, weighing about one sixth of a pound per bushel more.

The soil was mixed. The sort of wheat was Golden Drop."

Journal of Eng. Ag. Soc. v. iii, p. 24.

C.

ON THE CULTIVATION OF WHEAT—BY ELIAS PHINNEY.

Lexington, Feb. 1, 1840.

Dear Sir,—Your favor of the 25th ult. was duly received. You ask my opinion as to the probable success of the wheat culture in Massachusetts, and request me also to give the results of my own experience in the cultivation of this crop. Allow me, my good sir, the yankee privilege of answering one question by asking another. Why may not wheat be successfully cultivated in our State? It succeeds

east, west, north, and south of us, and why not here? Our climate is certainly as favorable as that of any part of the country, and as far as atmospheric causes have a bearing, we have as little to fear from that source as the most favored region on earth. I am aware it may be objected that our lands are not so new as that of many parts of our country where wheat is grown, and that most writers upon the subject consider a granite or light free soil as less favorable to the growth of this crop, than a strong, deep aluminous or clayey soil. Supposing these objections to be well founded, they can be at once obviated; the first by deep ploughing, and the second by the application of manure and lime. Our old fields which have been subjected to the immemorial usage of shallow ploughing and stinted manuring, will neither produce wheat nor any other crop that will pay the expense of cultivating. The farmer suffers no greater loss from a blighted field of wheat, than from a starved crop of corn. I would recommend then, to farmers who would succeed in the cultivation of wheat, or any other crop, to plough deep, turn up and keep at the surface a liberal portion of the subsoil which our fathers have left undisturbed, let them nourish their hungry and exhausted fields with a bountiful supply of manure and lime, and rely upon it, they will no longer complain of blighted crops and unproductive harvests.

The parable of the "sower who went out to sow," contains much agricultural as well as moral and religious instruction. The seed that "fell upon stony ground *which had not much earth*," like that which is sown upon our shoal ploughed fields, sprung up and grew the better at first, "by reason of its having but little depth of earth," but as soon as the sun was up and the season advanced, "it was scorched, and because it had no root it withered away." Here is an admirable lesson for farmers, and the reasoning of the sacred teacher is as sound and unanswerable in an agricultural, as it is in a moral and religious point of view. Let the farmers then sow their seed upon "good ground," deeply ploughed and liberally and rightly manured, and we shall hear no more of the necessity of legislative bounty as an inducement to the culture of wheat.

My opportunities, however, for noticing the results of the attempts of others in the cultivation of wheat, and my means of judging of the causes of their failure, where they have been unsuccessful, may perhaps be considered too limited, to authorize me to express a decided opinion or enable me to become a safe adviser on this subject. It is, sir, to your experience, to your careful and laborious researches, that

the agricultural community must look for much valuable and satisfactory information in a matter in which their interest as farmers is so deeply involved. Allowing me, however, to judge from my own experience, I say without hesitation I have no doubt as to the successful culture of this valuable crop in all parts of the Commonwealth; I mean with a due application of skill in the management and cultivation of our grounds.

The soil of my farm consists of a thin loam upon a hard, gravelly subsoil, being what geologists call a granite soil, and is similar to that of a great part of the Commonwealth; and I believe by adopting a correct mode of culture, is capable of producing wheat with as much certainty as any other crop.

My first attempt in the culture of wheat was twelve years ago, upon a field of two acres. The soil, a pretty deep loam upon a gravelly subsoil. The field had been planted for two or three years previous with corn and potatoes. I ploughed shoal, and not knowing the necessity of lime, I used none. The crop failed, yielding me but little more than twice the quantity of seed sown. The seed was a common kind of wheat procured in the neighborhood. Three years after, I commenced again sowing wheat, but with a different method of culture, and for nine years past have not failed in a single instance of having a good crop. I will give you the result of my practice for the three years past.

In the spring of 1837, I sowed a field of six acres. The field having been then recently set to an orchard, had been under the plough for two or three years and planted with corn and roots. Early in the spring the field was ploughed deep, bringing to the surface a considerable portion of the fresh earth which had never before been disturbed. Two bushels of Black Sea wheat having previously been steeped twenty-four hours in strong brine, and rolled in slacked lime, were sowed to the acre upon the furrow. At the same time I had spread upon the field 100 bushels to the acre of lime and peat ashes, an equal part of each, which had been mixed and lay in a heap for some weeks. The field was then well harrowed and rolled. There was no appearance of blight or rust. At the time of harvesting, I gathered and threshed one acre, probably the best, and it yielded 25 bushels of remarkably handsome grain.

In 1838, I sowed a field of the same number of acres, which was in grass in the spring of 1837. The soil, a thin vegetable mould resting upon a gravelly subsoil, and alternately under the plough and in grass

for near a century. In the spring of that year, 1837, the sward was turned over flat, the plough running deep and bringing to the top from one to two inches of subsoil, which had never before been disturbed, and by never cross ploughing, this fresh earth was kept at the surface. The field was then rolled and harrowed, and twenty loads of compost manure spread to the acre, harrowed again, and planted with corn. I put in the drills which had been marked out for the corn, twenty bushels of lime and plaster of Paris. I had a pretty good crop of corn, seventy bushels to the acre. In the cultivation of the corn, not a foot of the sward was suffered to be turned back or disturbed. In the spring of 1838, the field was made smooth by the use of the cultivator and harrow, and two bushels of Black Sea wheat, prepared as in the previous year, three pecks of herds grass, and one bushel of red top seed sowed to the acre. I then spread on fifty bushels of slacked lime to the acre, and the whole was harrowed and rolled. The straw was large and clean. In consequence of heavy rains followed by strong winds, about the time of filling, it lodged in some places, and the produce was in some measure thereby lessened. It gave me, however, over twenty bushels to the acre of well filled grain.

In 1839, I sowed a field of eight acres, which until 1838 had been pastured for twenty-five years. The soil, an exceedingly thin and light one, with gravelly bottom, yielding hardly herbage enough to form a sward. Thin as this soil was, in the spring of 1838 I had it ploughed from four to six inches deep, turning it over as flat as the nature of the ground would admit. So much of the gravelly and apparently unproductive material was brought to the surface, that it gave the field a very unpromising aspect. After ploughing, it was rolled and harrowed, about twenty loads of manure from my hog-pens put on each acre, and planted with corn, which was cultivated without breaking up the sward. I had forty bushels of corn to the acre. A small crop, but considering the very poor quality of the soil, it was as great as might reasonably have been expected. The method of cultivating this field was more with a view to future operations than for the immediate crop. In the spring of 1839, I broke up the corn-stubble, and loosened the surface with the cultivator and harrow, spread one hundred bushels to the acre of barilla ashes, fifty per cent. of which was lime, sowed two bushels of the same kind of wheat to the acre, having previously steeped it fourteen hours in a strong pickle, and rolled it in lime. Intending the field for pasture, I sowed a large quantity of all the kinds of grass seed that could be procured, and finished with the

harrow and roller. There was no appearance of blight nor rust upon the wheat. Though the heads were short, owing to the thinness of the soil, the kernel was plump and well filled, and makes as white and fine flour as the best Howard street. I cannot state the quantity produced on this field, as it is not all threshed. I judge there will be at least from fifteen to twenty bushels to the acre.

I have now given you, my dear sir, all the practical information which I possess on the subject of the wheat culture, and leave it for you to judge whether my opinion as to its eventual success is well founded.

With me, the wheat crop has as seldom failed, as any crop which I am in the habit of growing. Less liable to be injuriously affected by the vicissitudes of the season, or the alternation of dryness and moisture, than a crop of corn or potatoes.

With great respect,

Your obedient servant,

E. PHINNEY.

MR. HENRY COLMAN.

Extract from a Letter of Zebina Stebbins, of Deerfield, Mass.

“MR. H. COLMAN :

Sir,—Agreeable to your request, I transmit you some particulars of my success in raising wheat. In January, 1838, I was induced to send to Oneida county, N. Y., for some of the Italian spring wheat. I procured and sowed nine bushels upon six acres, soaking it in brine and rolling it in lime; and harvested twenty bushels per acre, of very fine plump berry, though the land was rather inferior, having received very little manure the previous year.

I was induced to extend the cultivation still further the last year. At Lockport, N. Y., in the fall of 1838, I purchased ten bushels of seed, of the Indiana winter wheat. In October, I sowed six bushels of this seed on three acres of new land, merely dragging it in, (harrowing.) From this I harvested 92 bushels of as handsome wheat as I ever saw. This wheat I sowed without any preparation of the seed. I also sowed, the same fall, about six acres more with winter wheat, on old land turning under a second crop of clover. This wheat was very

badly winter killed; still I think I should have had a very good crop had it not been for the warm rains about the time of the filling of the berry, when it appeared to shrink one third; the straw was stout enough.

In the spring of 1839, I sowed seven and one half acres with the Italian wheat, soaking it in brine and rolling it in lime, as above stated. When the wheat began to spread, I sowed on about three bushels of wood ashes per acre. This was all the application I made to it. The land was planted with corn the previous year, and received about ten loads of manure per acre. I would observe that I have for a number of years practised overhauling my manure early in the spring, and mixing lime with it. This I think has been a great help to my corn crop; also to the succeeding crop. Thus, the last year, I harvested sixteen and one half acres of wheat, from which I have threshed $346\frac{3}{4}$ bushels, and have received a bounty from the State of \$18 50. I think, though some of my winter wheat was blasted, it has been as profitable as any crop I have raised. The price of wheat here now is \$1 50 per bushel. Of Indian corn, 83 cts. Of oats, 45 cts. The wheat will average 30 dollars per acre. Forty bushels of corn is a fair crop for this part of the State, and at 83 cts. would amount to about 33 dollars per acre; and taking out the extra labor for corn, and the balance would be in favor of the wheat crop. Oats would yield 50 bushels per acre. This is still a poor crop. I do not say that all wheat will yield as much as mine. Still we may generally calculate upon a fair crop. We sometimes fail in a corn crop as well as in wheat. On the whole, I think that by liming our lands and practising turning under green crops, we may restore the wheat qualities to our land which has been worn out by the old way of farming."

March, 1840.

D.

MANURES FOR WHEAT.

"The effect of different manures on wheat is very remarkable. Stable manure will in ordinary good soils have the effect of causing the plant to tiller much, or to make straw and grass, thereby diminishing the produce in grain and meal considerably."

"Liquid manure, one third stable drainings and two-thirds water,

which I caused to be poured over wheat that was just tillering, made the straw grow rank and coarse; the grain of every variety of wheat was dark and thick-skinned, hence containing less meal. The same quantity and mixture of liquid manure, poured a second time over another portion of wheat caused it to grow rank and full of leaves rather than straw, that only a few of the plants produced ears of wheat, some having run up into sharp points, with merely the rudiments of ears indicated. The few ears that produced corn, displayed it in its worst form, hardly in the shape of meal, of a doughy, soft texture, evidently unfit for the food of man, besides some of them were smutty. Thus an over application of manure, excellent when judiciously applied, becomes a poison, precisely in the same manner as in the human constitution a surfeit is usually the parent of disease."

"The wheat on either side of these experiments, which had only been manured with the ashes of kelp or sea-weed was healthy, productive, and farinaceous in the highest degree. Kelp or the ashes of rock seaweed, that which is cut is the best of all."

"I am inclined to believe, that paring and burning an old ley, will almost produce as equally good effect, where the land is suited to it, with the ashes of kelp; for although the ashes may not be of that superior quality or possessing all those virtues peculiar to kelp ashes, still the much greater portion of ashes, that can by this means be spread, may make amends in quantity and quality."

"Kelp ashes should lay on the surface of the soil a month or two previous to sowing, in order to weaken their caustic power, or they are otherwise apt to burn the young and tender shoots of the corn as well as the larvæ of insects; but by laying a certain length of time on the surface exposed to the action of the atmosphere, or perhaps what would be a better practice, merely lightly turned into the soil, they become eminently beneficial."

"From lands in a very bad state, infested with couch grass in 1832, by means of paring and burning previous to taking a crop of potatoes, which produced thirty-four thousand eight hundred pounds of saleable potatoes to the acre; and with an after dressing of forty bushels to the acre of kelp or sea-weed ashes, I raised forty bushels of fine wheat to the acre. One season I raised fifty-five, and last season fifty-one bushels; this year I hope to have reaped as much with drill husbandry, though on land in a very bad state, which had been much neglected."—*Le Coteur*.

“Kelp, in commerce; the ashes of sea-weeds or *fuci*. (*Fucus serratus* and *F. vesiculosus*.) The species used in the manufacture of this article, grow attached to rocks between high and low water mark, and are often termed *rock-weed*. On the Scottish coast, the sea-weed is cut close to the rocks, during the summer season, and afterwards spread out upon the shore to dry, care being taken to turn it occasionally, to prevent fermentation. It is then stacked for a few weeks, and sheltered from the rain till it becomes covered with a white saline efflorescence, and is now ready for burning. This is usually accomplished in a round pit, lined with brick or stone; but the more approved form for a kiln is oblong, about two feet wide, eight to eighteen long, and from two to three deep; the bottom of this is covered with brush, upon which a little dried sea-weed is scattered, and fire is applied at one extremity; the sea-weed is now thrown on gradually, as fast as the combustion reaches the surface, and should there be much wind, it is necessary to protect it by covering the sides with sods; after the whole is burnt, the mass gradually softens, beginning at the sides, when it should be slowly stirred up with a heated iron bar, and incorporated, till it acquires a semi-fluid consistence. This part of the process requires considerable dexterity; and, if the mass continues dry, a little common salt should be thrown on, which acts as a flux. When cold, it is broken up, and is now ready for sale. Notwithstanding that kelp contains but two or three per cent. of carbonate of soda, while Spanish barilla often contains twenty or thirty, the manufacture of this article has increased prodigiously on the northern coasts of Great Britain and the neighboring islands. Small farms in the Orkneys, which formerly rented for £40 a year, have now risen to £300, on account of their kelp shores; and so much importance is attached to this branch of business, that, along sandy shores, stones have been placed within the flood-mark, which, in a short time, become covered with sea-weed. Many thousand tons are thus manufactured annually, and are sold in the various ports of Great Britain, at the rate of from 7 to £10 per ton.” “New England being the only part of the United States which has a rocky coast, would seem to be the only part of our country fitted for the manufacture of kelp. The greater rise of the tides north of Cape Cod, and especially in the more eastern parts, is also a favorable circumstance; indeed, this branch of business has been carried on in the state of Maine.”

The carbonate of soda comes to us under the name of barilla from Spain; and the ordinary article is made abundantly on the shores of

Scotland and the islands of Jersey and Guernsey. Whether it can be purchased at a rate which will warrant a farmer here in applying it, can be determined only by trial, and the current price of the article at the time. I believe the ordinary article may often be purchased at a low rate; and I hope the experiment will be made. It may certainly be safe on a small scale.

Of the use of sea-weeds in a crude state, I shall treat fully hereafter.

"Leached ashes are found to succeed best on dry loamy lands, or loam mixed with sand. It is considered the cheapest manure that can be applied. Ten loads of this manure on poor land will produce, ordinarily twenty-five bushels of wheat. The land is then left in a condition for yielding a crop of hay. No manure continues so long in the ground as ashes."—*New York Agrl. Soc. Trans.* 1792.

On the use of ashes as a manure, I beg leave to refer to the very instructive letters of Dr. S. L. Dana, in the appendix to the second report of the Agriculture of Massachusetts, p. 157.

A. Nichols' statement to the Committee of the Essex Agricultural Society on manures :

Persuaded of the importance of the discoveries made by Dr. Samuel L. Dana, of Lowell, and given to the world through the medium of the reports of Professor Hitchcock and Rev. H. Colman, to the Legislature of Massachusetts, concerning the food of vegetables, geine, and the abundance of it in peat mud, in an insoluble state to be sure, and in that state not readily absorbed and digested by the roots of cultivated vegetables, but rendered soluble and very easily digestible by such plants by potash, wood ashes, or other alkalies, among which is ammonia, one of the products of fermenting animal manures, I resolved last year to subject his theories to the test of experiment the present season. Accordingly I directed a quantity of black peat mud, procured by ditching for the purpose of draining and reclaiming an alder swamp, a part of which I had some years since brought into a state highly productive of the cultivated grasses, to be thrown in heaps. During the winter, I also had collected in Salem, 252 bushels of unleached wood ashes at the cost of $12\frac{1}{2}$ cents per bushel. These were sent up to my farm, a part to be spread on my black soil grass lands, and a part to be mixed with mud for my tillage land. Two hundred bushels of these were spread on about six acres of such grass land

while it was covered with ice and frozen hard enough to be carted over without cutting it into ruts. These lands produced from one to two tons of good merchantable hay to the acre, nearly double the crop produced by the same lands last year. And one fact induces me to think, that being spread on the ice, as above mentioned, a portion of these ashes was washed away by the Spring freshet. The fact from which I infer this, is, that a *run* below, over which the water coming from the meadow on which the largest part of these ashes were spread flows, produced more than double the quantity of hay, and that of a very superior quality to what had been ever known to grow on the same land before.

Seventy bushels of these ashes, together with a quantity not exceeding thirty bushels of mixed coal and wood ashes, made by my kitchen and parlor fires, were mixed with my barn manure, derived from one horse kept in stable the whole year, one other horse kept in stable during the winter months, one cow kept through the winter, and one pair of oxen employed almost daily on the road and in the woods, but fed in the barn one hundred days. This manure was never measured, but knowing how it was made, by the droppings and litter or bedding of these cattle, farmers can estimate the quantity with a good degree of correctness. These ashes and this manure were mixed with a sufficient quantity of the mud, above mentioned, by forking it over three times, to manure three acres of corn and potatoes, in hills four feet by about three feet apart, giving a good shovel full to the hill. More than two thirds of this was grass land, which produced last year about half a ton of hay to the acre, broken up by the plough in April. The remainder was cropped last year without being well manured, with corn and potatoes. Gentlemen, you have seen the crop growing and matured, and I leave it to you to say whether or not the crop on this land would have been better had it been dressed with an equal quantity of pure, well rotted barn manure. For my own part I believe it would not, but that this experiment proves, that peat mud, thus managed, is equal if not superior to the same quantity of any other substance in common use as a manure among us; which, if it be a fact, is a fact of immense value to the farmers of New England. By the knowledge and use of it, our comparatively barren soils may be made to equal or excel in productiveness the virgin prairies of the West. There were many hills in which the corn first planted was destroyed by worms. A part of these were supplied with the small Canada corn, a part with beans. The whole was several times cut down by frost.

The produce was three hundred bushels of ears of sound corn, two tons of pumpkins and squashes, and some potatoes and beans. Dr. Dana, in his letter to Mr. Colman, dated Lowell, March 6, 1839, suggests the trial of a solution of geine as a manure. His directions for preparing it are as follows: "Boil one hundred pounds of dry, pulverized peat with two and a half pounds of white ash, (an article imported from England,) containing 36 to 55 per cent. of pure soda, or its equivalent in pearlash or potash, in a potash kettle, with 130 gallons of water; boil for a few hours, let it settle, and dip off the clear liquor for use. Add the same quantity of alkali and water, boil and dip off as before. The dark colored brown solution contains about half an ounce per gallon of vegetable matter. It is to be applied by watering grain crops, grass lands, or any other way the farmer's quick wit will point out."

In the month of June, I prepared a solution of geine, obtained not by boiling, but by steeping the mud as taken from the meadow, in a weak lye in tubs. I did not weigh the materials, being careful only to use more mud than the potash would render soluble. The proportion was something like this: peat 100 lbs., potash 1 lb., water 50 gallons; stirred occasionally for about a week, when the dark brown solution, described by Dr. Dana, was dipped off and applied to some rows of corn, a portion of a piece of starved barley, and a bed of onions sown on land not well prepared for that crop. The corn was a portion of the piece manured as above mentioned. On this the benefit was not so obvious. The crop of barley on the portion watered was more than double the quantity both in straw and grain to that on other portions of the field, the soil and treatment of which was otherwise precisely similar.

The bed of onions which had been prepared by dressing it with a mixture of mud and ashes previous to the sowing of the seed, but which had not by harrowing been so completely pulverized, mixed, and kneaded with the soil as the cultivators of this crop deem essential to success, consisted of three and a half square rods. The onions came up well, were well weeded, and about two bushels of fresh horse manure spread between the rows. In June, four rows were first watered with the solution of geine above described. In ten days, the onions in these rows were nearly double the size of the others. All but six rows of the remainder were then watered. The growth of these soon outstripped the unwatered remainder.

Mr. Henry L. Gould, who manages my farm, and who conducted all

the foregoing experiments, without thinking of the importance of leaving at least one row unwatered, that we might better ascertain the true effect of this management, seeing the benefit to the parts thus watered, in about a week after, treated the remainder in the same manner. The ends of some of the rows, however, which did not receive the watering, produced only very small onions, such as are usually thrown away as worthless by cultivators of this crop. This fact leads me to believe that if the onions had not been watered with the solution of geine, not a single bushel of a good size would have been produced on the whole piece. At any rate it was peat, or geine rendered soluble by alkali, that produced this large crop.

The crop proved greater than our most sanguine expectations. The onions were measured in the presence of the chairman of your committee, and making ample allowance for the tops which had not been stripped off, were adjudged equal to four bushels to the square rod, or at the rate of 640 bushels to the acre. In these experiments, 7 lbs. of potash which cost 7 cts. a pound, bought at the retail price, were used. Potash, although dearer than wood ashes, at 12½ cents per bushel, is, I think, cheaper than the white ash mentioned by Dr. Dana, and sufficiently cheap to make with meadow mud a far cheaper manure than such as is in general used among our farmers. The experiment satisfies me that nothing better than potash and peat can be used for most, if not all our cultivated vegetables, and the economy of watering with a solution of geine, such as are cultivated in rows, I think cannot be doubted. The reason why the corn was not very obviously benefited, I think must have been that the portion of the roots to which it was applied, was already fully supplied with nutriment out of the same kind from the peat ashes and manure put in the hill at planting. For watering rows of onions or other vegetables, I should recommend that a cask be mounted on light wheels, so set that like the *drill* they may run each side of the row, and drop the liquid manure through a small tap hole or tube from the cask, directly upon the young plants. For preparing the liquor, I should recommend a cistern about three feet deep, and as large as the object may require, formed of plank, and laid on a bed of clay, and surrounded by the same, in the manner that tan vats are constructed; this should occupy a warm place, exposed to the sun, near water, and as near as these requisites permit, to the tillage lands of the farm. In such a cistern, in warm weather, a solution of geine may be made in large quantities with little labor and without the expense of fuel, as the heat of the

sun is, I think, amply sufficient for the purpose. If from further experiments it should be found economical to water grass lands and grain crops, a large cask or casks placed on wheels and drawn by oxen or horse power, the liquor from the casks being at pleasure let into a long narrow box perforated with numerous small holes, which would spread the same over a strip of ground, some six, eight or ten feet in breadth, as it is drawn over the field in the same manner as the streets in cities are watered in summer.

The piece of land mentioned in the foregoing statement, contained two acres, three quarters, thirty-one rods.

Danvers, December, 1839.

E.

ON PLOUGHING IN CROPS FOR MANURE.

Boston, March 25, 1840.

DR. S. L. DANA,

Dear Sir,—Two successful and experienced farmers one in Franklin and one in Berkshire county, have come to the conclusion, that, in turning in crops by way of enriching the land, more benefit is derived, that is, the fertility of the land is more advanced by ploughing in a crop after it has become dried or dead, than by turning it in in its greatest luxuriance and greenness. One of them showed me the results of an experiment tending to this point, which appeared strongly to favor his conclusions. A well-established fact is better than the most elaborate hypothesis; and prejudices, however strong, must yield to facts.

Allow me under these circumstances, to inquire whether, upon your principles or philosophy of vegetation, there occur to you any good reasons for a result so much at variance with popular opinion. Your views in full on this subject, will add to the obligations under which you have already laid the public and your respectful friend and servant,

HENRY COLMAN.

Lowell, March 28, 1840.

DEAR SIR,—

The results referred to in your letter, are opposed to the common opinion. Common opinion, especially in agriculture, is not always founded on observation. It is oftener prejudice, than opinion; and, when inconsistent with well known facts, has not its source in observation or experiment. The whole resolves itself into this, DRY PLANTS GIVE MORE GEINE THAN GREEN. This follows from the little we know of the process termed “fermentation;” I use the term as commonly expressive of the spontaneous decay of vegetables. It includes the three stages of vinous, acid, and putrefactive fermentation. These are not necessarily dependant, following in regular progression. They are not cause and effect. Putrefaction may commence first, and it is so different from the other two, in all its stages and products, that the term “fermentation” ought never to have been applied to it. The greater part of vegetables are susceptible of putrefaction only, a small number become acid at once, and a still smaller number ever undergo vinous, acetous, and putrefactive fermentation. Fermentation then, in its widest sense, will help us to understand how dry crops may be better manures than green. Let us glance at the principles and products of fermentation.

1st. What vegetable substances are susceptible of the vinous fermentation, and what are its products?

The juices only which contain sugar, or starch, convertible first into gum and then into sugar by the action of *azotized* vegetable principles, especially gluten. Pure sugar never ferments. The vinous fermentation must be excited by some substance containing nitrogen. There are three things essential to vinous fermentation, air or oxygen gas, moisture in due proportion, and a temperature never below 50° F., nor above 86° F. The products of this process are gases, ferment or yeast, and vinous liquor. The gases are carbonic acid, and hydrogen. The yeast proceeds from a change in the organization of the gluten and albumen; some late French experimenters think it proceeds from a continued evolution of infusorial plants, hence yeast begets yeast, like sowing crops of seed. However, let us leave speculation. The main facts are as above stated. If, then, we plough in green plants, we put them in a temperature favorable to the commencement of vinous fermentation; we bury them full of sap—the requisite moisture for vinous fermentation;—we cover them, whilst their saccharine principle

is in its perfection. Every thing favors vinous fermentation. The sugar and starch of the plant fermented by its gluten and albumen, are converted into gases and alcohol, the former are lost in air, the last, washes away or is changed to vinegar. All that remains for the farmer is the altered gluten and albumen, which soon putrefy and form geine. All the starch and sugar of the plant are thus lost.

2d. What vegetable substances are susceptible of the acid fermentation, and what are its products?

The substances are, first, sugar, which, in certain cases, becomes acid, without undergoing vinous fermentation; second, gum. The circumstances essential to acid fermentation are air, moisture, and a temperature from 65° to 70° F.; acetic acid is itself the proper ferment of acid fermentation. Vinegar, as is well known, singularly promotes the formation of vinegar in vinous liquors. The products are; carbonic acid, acetic acid or vinegar, and some other acids, especially that called nanceic or zumic acid, which if not lactic, is perhaps only acetic acid, holding in combination, some azotized substance. This acid combines with the alkaline and earthy ingredients of plants and soils, and forms very soluble salts. Green plants, ploughed in, are at once placed in a situation most favorable for undergoing acid fermentation. We suffer a loss of a part of the carbon, and in addition to the sugar and starch, we now lose the gum of the plants. All these are capable of producing geine, and hence in ploughing in green crops, we lose a portion of manure.

3d. What are the vegetable substances susceptible of putrefaction, and what are its products?

With the exception of oils, resins, &c., every organized part of every vegetable may putrefy. The circumstances essential to this process, are air, a temperature not below 45°, and moisture. No perfectly dry plant ever putrefies, nor will a moist one, if air is excluded. I have had a capital example of the last, in a piece of a white birch tree, dug up from a depth of twenty-five feet below the surface in Lowell, this winter. It must have been inhumed there probably before the creation of man, at least at a time "whereof the memory of man runneth not to the contrary," yet this most perishable of all wood is nearly as sound as if cut from the forest last fall. A dried plant has parted with most of its sap, that moisture, essential to the commencement of vinous and acetous fermentation. During the very act of decay, from the moment when its living functions have ceased, new combinations of its elements begin. It has already begun to be destroyed by the very agents

which gave it life. This is the beginning of putrefaction. Let us not be deceived by a name. Putrefaction we always associate with disgusting effluvia. But in the wide sense we have defined it, it includes also the fragrance of new hay. Whenever bodies consist only of oxygen, hydrogen, carbon, and a trace of azote, their putrefaction is fragrant, or inodorous; when, in addition to these, bodies contain large portions of azotized matter, gluten, albumen, or sulphur, and phosphorus, putrefaction evolves abominable odors. To the agriculturist, putrefaction is always a wholesome process, beneficial to his best interests, when promoted and controlled. There is only one case, where this process produces loss. This may be termed *destructive putrefaction*; it is produced by heaping together green plants, or sometimes by moistening dry vegetable substances. Here oxygen is rapidly absorbed, and finally the mass takes fire, and burns. Up to the moment of inflammation this is putrefaction. New hay, stacked too green, is a familiar example. Volumes of steam are evolved, which proceed partly from the decomposition of the plant; decompositions, and recompositions rapidly ensue; these are the ferment, which keeps up the action till the plants burn. Doubtless, all green plants, ploughed in, undergo to a greater or less extent destructive putrefaction, which succeeds the vinous and acid fermentations, perhaps caused by the very rapidity of these processes. Hence, in addition to the sugar, starch, and gum of the plant, we lose a large portion of its other substances, by turning it in green. The products of this rapid fermentation have been but little studied. Happy the farmer who never witnesses the process. He should never induce it, and may generally prevent its extension, when once begun. It is a dead loss to him; but in all other cases of putrefaction, the products are valuable. These vary according as the process takes place: 1st, in air; 2d, at the surface of the ground; or, 3d, deep in the interior of the earth. The last need not detain us—it produces all the varieties of coal.

1st. In the free air, having access to all parts of a plant, putrefaction produces carbonic acid, nitric acid, and water. But ordinarily, in the air, as oxygen does not find ready access to all parts, a portion of the hydrogen of the plant combines then with the carbon, sulphur, phosphorus and azote of the plant, and we have carburetted, sulphuretted, and phosphuretted hydrogen, and ammonia produced. Now, as these exist but in small quantity in vegetables, the loss of hydrogen will not be very great by drying the plants, and it is possible, that the removal of these, may cause the other elements to enter into more

stable combinations, better fitted to produce geine. In all cases of putrefaction in the open air, oxygen is absorbed, and an equal bulk of carbonic acid given out, while, at the same time, the oxygen and hydrogen of the plant escape as water. The result is, that in the substance left, carbon exists in a greater portion, than in an equal weight of fresh vegetables. In all cases of putrefaction, new products are formed; these again resolve into others; and this action goes on till we have no longer any organic products; we have only binary or inorganic substances left. All our researches into the philosophy of the changes in fermentation, terminate in these binary products, that is, in compounds, consisting of only two elements. During all these various changes, a variety of substances must, of course, be formed. As the elements of living, so the elements of dead plants, are continually changing into new forms. Nature is admirably simple, and never so learned as our books. We ought not to dignify with a new name, every new product of putrefaction, which we may fortunately arrest. However various these products may be, whether products or educts of putrefaction, or of our analytical methods of separating them, all putrefaction at the surface of the earth, ends by forming a brownish, black, powdery mass, which combines with the alkaline, earthy and metallic bases in the plant. This substance has been called "GEINE." As I have elsewhere defined it, it is the decomposed organic matter of the soil. It is the product of putrefaction; continually subjected to air and moisture, it is finally wholly dissipated in air, leaving only the inorganic bases of the plant, with which it was once combined. Now, whether we consider this as a simple substance, or composed of several others, called crenic, apocrenic, puteanic, ulmic acids, glairin, apotheme, extract, humus, or mould, agriculture ever has, and probably ever will consider it one and the same thing, requiring always similar treatment to produce it; similar treatment to render it soluble when produced; similar treatment to render it an effectual manure. It is the end of all compost heaps to produce soluble geine, no matter how compound our chemistry may teach this substance to be.

Among the many economical modes of producing geine, the ploughing in of vegetable matter, has held a high rank. Nature teaches us to turn in the dried plant. Dried leaves are her favorite morsels, and the very fact, that Nature always takes the dried plant, from which to prepare the food of growing vegetables, should have taught us long ago, the wisdom of ploughing in dry crops. The careful collecting and husbanding of dried leaves, their superior efficacy in forming

compost, bears witness to the facts stated in your letter. That the use of dried leaves for compost, has not led to the turning in of dry crops, has probably arisen from the consideration, that a greater quantity of geine may be produced, by turning in two or three green crops in a season, than by one crop of dry. This needs experimental confirmation. The very act of tillage, on Mr. Keely's plan, by exposing the insoluble geine of one crop, to air, renders it soluble, while, at the same time, two or three green crops must form a greater quantity of salts. If only one crop can be turned in, let it be dry. All our philosophy, and the late experiments of your agricultural friends, confirm this view.

With great respect,

I am very truly, yours,

SAM'L L. DANA.

REV. H. COLMAN,
Agricultural Commissioner.

F.

EXPERIMENT IN FORWARDING SEEDS.

The subjoined experiment rests upon unquestionable authority. No one could be more relied upon for exactness and care, than the eminent man who made it. It is a most striking result. What is applicable to one kind of seeds is doubtless applicable, in a degree, to all seeds; and nothing can more emphatically illustrate the importance of care in the selection of seeds.

H. C.

Experiment, showing the Importance of selecting the first ripe Seeds, communicated to the Trustees of the Agricultural Society, by JAMES FREEMAN, D. D., Sept. 1, 1805.

To ascertain whether the ripening of seeds can be forwarded, by sowing those which are the earliest ripe, I have made experiments, all of which have been successful, on several different sorts. It will be sufficient to mention one only.

In the year 1801, I planted the case knife bean. The pods first

formed, which are commonly those nearest the root, were reserved ; and when about the quantity of a peck was fully ripe, they were gathered on the same day. The largest and fairest of seeds were planted the next year, and the first-formed pods reserved as before. The same method has been pursued without any variation, till the present year ; by means of which, whilst the bean has not degenerated in its quality, the ripening of the seeds has been forwarded twenty-six days ; as will appear from the following table.

Planted.		Gathered.	No. days.
1801,	May 20,	September 9,	112
1802,	" 11,	August 21,	102
1803,	" 10,	" 8,	99
1804,	" 8,	" 4,	88
1805,	" 6,	July 31,	86

The first column denotes the time of planting the seeds ; the second, that of gathering the seeds, which were first ripe ; and the third, the number of days which elapsed between the time of planting and the time of gathering.

As in the second and following years, I anticipated the time of planting the seeds, (by which means fourteen days have been gained, in addition to the twenty-six noted above,) to determine what effect later planting would produce, by giving the seeds more advantage from the heat of summer, in the years 1804 and 1805, I put into the ground a quantity of seed, about a week later than that which was first planted. The event which took place, is exhibited in the following table.

Planted.		Gathered.	No. days.
1840,	May 14,	August 8,	86
1805,	" 13,	" 6,	85

As very little time has been gained in the present and in the preceding year, I suppose I have now reached, or nearly reached, the *ne plus ultra*. I delay not, therefore, to communicate to the Trustees

of the Agricultural Society, the result of an experiment, which confirms the important truth, taught in various parts of their useful publications. *That, to ensure an early and good crop, the seeds reserved for future sowing should be those, which are the first ripe, and which are, in other respects, the most perfect.*

Extracts from a letter of Joseph Cooper, of New Jersey, in 1799.

* * “This kind of corn I have continued planting ever since, selecting that designed for seed in the manner I would wish others to try, viz.—When the first ears are ripe enough for seed, gather a sufficient quantity for early corn, or replanting; and at the time you would wish your corn to be ripe generally, gather a sufficient quantity for planting the next year, having particular care to take it from stalks that are large at bottom, of a regular taper, not over tall, the ears set low, and containing the greatest number of good sizeable ears of the best quality, let it dry speedily, and from the corn gathered as last described, plant your main crop, and if any hills should be missing, replant from that first gathered, which will cause the crop to ripen more regularly than is common, which is a great benefit. The above mentioned I have practised many years, and am satisfied it has increased the quantity, and improved the quality of my crops beyond what any person would imagine, who has not tried the experiments.”

“For many years past, I have renewed the whole seed of my winter grain, from a single plant which I have observed to be more productive, and of better quality than the rest, which I am satisfied has been of great use, and I am fully of opinion, that all kinds of garden vegetables may be improved by the foregoing methods.”

G.

ANALYSIS OF DIFFERENT VARIETIES OF WHEAT.

To show the extraordinary exactness with which experiments have been made in this matter, I subjoin the following tables. The weights given in the first table are apothecaries', and “gros” means drams.

TABLE I.—FROM LE COUTEUR.

An Experiment to ascertain the quantity of Meal, or Flour and Bran, in each of fourteen varieties of wheat under trial.

Nos.	DESCRIPTION OF GRAIN.	Half Gill Measure Weighed.			Produced in Flour.			Produced in Bran.			Total in Grinding.			Loss in Grinding.		
		oz.	grs.	grs.	oz.	grs.	grs.	oz.	grs.	grs.	oz.	grs.	grs.	oz.	grs.	grs.
1	White Dantzie—large round, - -	1	5	22	1	0	42	0	4	24	1	5	2	0	0	26
2	Small round, - - - - -	1	4	50	0	7	50	0	4	34	1	4	24	0	0	30
3	Reddish round, - - - - -	1	4	37	0	7	5	0	5	14	1	4	19	0	0	13
4	Fine White—longish, - - -	1	4	46	0	6	3	0	6	37	1	4	50	0	0	16
5	Fine White Seedling—roundish, -	1	4	39	0	6	3	0	6	20	1	4	32	0	0	7
6	Fine White, - - - - -	1	4	52	0	7	18	0	5	11	1	4	29	0	0	13
7	Coarse Yellow—round, - - -	1	4	50	0	6	51	0	5	41	1	4	28	0	0	22
8	Fine White, - - - - -	1	5	4	0	7	24	0	5	12	1	4	26	0	0	32
9	Plump Whitish—roundish, - -	1	4	38	0	6	46	0	5	32	1	4	14	0	0	24
10	Whitish, - - - - -	1	4	39	0	7	20	0	5	4	1	4	24	0	0	15
11	Reddish Yellow, - - - - -	1	4	44	0	6	57	0	5	39	1	4	32	0	0	12
12	Yellow—round, - - - - -	1	4	44	0	6	8	0	6	26	1	4	34	0	0	10
13	Liver—elongated, - - - - -	1	4	32	0	6	34	0	5	44	1	4	14	0	0	18
14	Reddish Yellow—plump, - - -	1	4	28	0	6	28	0	5	29	1	3	57	0	0	31

The straw of wheat is generally reckoned to be about double the weight of grain—an acre producing twenty-four bushels of wheat of ordinary quality, may then be presumed to yield about twenty-six hundred weight of straw. This rule, however, is not certain.

Some exact experiments as to the relative amount of straw to wheat, have given the following results; avoirdupois weight.

No. I.	gave 3 lbs. 3 oz. of wheat;	3 lbs. 9 oz. of straw.
“ II.	“ 2 lbs. 12 oz. “ ;	3 lbs. 4 oz. “
“ III.	“	6 oz. more straw than grain.
“ IV.	“ 4 lbs. 4 oz. “ ;	3 lbs. 13 oz. of straw.
“ V.	“ 2 lbs. 9 oz. “ ;	3 lbs. 15 oz. “
“ VI.	“ the grain 7 oz. more than the straw.	

I insert also two other tables, exhibiting the results of other experiments on the values of different wheats. These from the Journals of the English Agricultural Society.

References to Table II.—“Proceeding thus, the whole ground was finished, and then one grain of wheat was dropped into each hole. The rows were thus exactly 6 inches apart, and the grains in the rows were 3 inches from one another. The regularity with which the planting was performed was thus mathematically accurate. The ground was 67 feet in length; and 3 rows of each variety of wheat were planted, except the first and last numbers, of which there were 4 rows. The outer row of each of these, however, was not taken into account, because their roots had a much greater extent of ground for their growth than the others, whose roots touched one another all round. The end plants of each row were also rejected for the same reason. Sixty-six feet in length of ground were thus taken up, and 3 rows of each variety occupied in width $1\frac{1}{2}$ foot: the ground occupied by each variety was thus 99 square feet, the 440th part of an acre.

(On page 198, is a tabular account of this experiment.)

The seed from which the first 10 varieties were raised, was carefully selected from specimens of each obtained in the ear. The others were from samples, and here, also, the greatest care was taken that the seed from which each was raised, should be the best and plumpest that could be obtained.

The first four columns need no explanation beyond what is given at the head of each: the fifth shows the number of grains lost from casualties. If the frost had been the only agent in the destruction of so

many of the seeds, this column might have been considered as a very accurate index of the relative hardness of each variety. This, however, is not the case, for the havoc which the birds made must also be taken into account. It was thought at the time, that more injury was sustained, from the latter cause, by those varieties planted, on the 21st, than by any of the others; but this does not appear to have been the case, for, if the great loss sustained by these had been wholly owing to the havoc committed by the birds, it is evident that the varieties marked Nos. 12 and 15 would not have been so slightly injured, while Nos. 11, 13, 14, and 16, suffered so severely. The figures in this column may, therefore, be said to indicate with tolerable accuracy the relative ability of each variety to withstand the effects of a severe and changeable winter, such as that during which the experiment was made.

The number of plants of each variety which came to perfection, is placed opposite the name of each in the sixth column. This was ascertained by pulling each as they respectively ripened, and counting the plants of each before proceeding to the others. In this way, by a simple subtraction, the numbers contained in the fifth column, also, were ascertained.

When all the plants of any variety had been pulled, the number of ears, also, belonging to them was counted, and the results are placed in the seventh column.

By dividing these by 99, the number of square feet which each variety occupied, we obtain the number of ears in each square foot; and this is placed opposite the name of each wheat, in the eighth column.

The average number of ears to each root, ascertained by dividing the number of ears by that of the roots, is placed in the ninth column. This column shows the degree in which each species possesses the important property of spreading and shooting out stems, or, as it is technically termed, of *tillering*; and it will be seen that they vary in this respect greatly.

After having been pulled and dried, the wheat was carefully rubbed out; and the light and imperfect grains had been separated, the weight of the remainder was taken, and placed opposite each sort, in the tenth column.

The twelfth column contains the number of bushels per acre raised from each variety. The amount per acre allowed at the rate of 64 lbs. to a bushel.

The weight of straw, which is placed in the fourteenth and fifteenth columns, was ascertained after the roots had been cut off, and after it had remained out sufficiently long to dry it perfectly."

TABLE II.—FROM JOHN MORTON, ENGLAND, WITH REMARKS.

When planted.	No.	NAME OF WHEAT.	Number of seeds planted.	Loss of seeds from birds, frost, &c.	Produce of square feet.		No. of ears in one square foot.	Average number of heads per foot.	Weight of grain produced from 99 square feet.	Weight of wheat per acre.		No. of bushels per acre, at 64 lbs. per bushel.	Length of straw.	Weight of straw produced from 99 square feet.	Weight of straw per acre.								
					Plants or roots.	Heads of grain.				tons, cwt, qrs, lbs.	lbs.				ft. in.	lbs.	tons, cwt, qrs, lbs.						
Nov. 15,	1	Old red Lamas,	-	357	405	2463	25	6	6	1	3	2	8	41	5	8	16 1-2	3	5	2	24		
"	2	Golden Drop,	-	291	501	2542	25	5	6	3-4	1	6	2	8	46	3-4	5	6	15 1-4	3	0	3	
"	3	Ten-rowed Prolific,	-	391	401	1935	19	3	2-5	4 1-2	0	16	2	16	27	5	5	12 3-4	2	10	0	10	
"	4	Hunter's,	-	273	519	2028	20	4	1-5	4 1-2	0	16	2	16	27	5	6	12 3-4	2	12	0	10	
"	5	Thick-set Suffolk,	-	120	672	3039	30	4	1-2	10 1-2	2	1	1	0	72	1-4	5	8	19 1-2	3	5	2	14
"	6	Hickley's Prolific,	-	132	657	2686	29	4	1-3	10 1-6	1	19	3	3	69	1-2	5	7	16 1-2	3	5	2	24
"	16,	White Taunton,	-	305	487	2695	27	5	1-4	6	1	3	1	20	41	1-2	5	6	15 1-4	3	0	0	0
"	8	Silver Drop,	-	218	574	2582	26	4	1-2	8	1	11	1	20	55	5	6	13 1-2	3	12	2	12	
"	9	Scotch White,	-	379	413	2386	24	5	3-4	6 1-4	1	4	2	6	43	5	9	16 1-2	3	5	2	24	
"	10	Talavera,	-	434	358	1985	20	5	1-2	5 1-4	1	0	2	14	36	5	8	14 1-2	2	16	3	14	
"	21,	Smithers' Hereford White,	-	319	473	2529	25	5	1-3	9 1-2	1	17	1	8	65	1-2	5	6	17 1-2	3	8	3	20
"	12	A Red Wheat,	-	232	540	3453	35	6	2-5	12	2	5	1	12	82	1-2	5	0	22	4	7	0	2
"	13	Egyptian Cone,	-	528	264	711	7	2	1-3	3 3-8	0	13	0	24	23	6	0	8 1-4	1	11	2	2	
"	14	Red Straw Lamas,	-	510	282	2096	21	7	3-5	4 1-2	0	16	2	16	27	5	8	14 1-2	2	16	3	4	
"	15	Blue Cone,	-	264	528	1626	16	5	6	6	1	3	1	28	41	1-2	6	0	9 3-4	1	16	1	16
"	16	Red Cone,	-	456	336	2446	24	7	10	10	1	19	1	4	68	3-4	5	3	12 1-2	2	9	0	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15									

TABLE III.—FROM LE COUTEUR'S PRIZE ESSAY.

Comparative Statement of the results of different Wheats.

	Soil.	Manure.	Quantity of Seed per acre.	Time of Sowing.	Harvested.	Produce per acre.				Produce per acre in		
						Grain.	Straw.	Chaff.	Weight of bushels.	Finest Flour.	Flour, &c. (Pollard & Bran.)	Produce of Bread from 18 lbs. of Flour.
White Downy.	Argillace's Schist, light and rich.	Kelp ashes, 9 qrs.	2 bush.	Jan. 29	Aug. 16.	48	4557	315	62	2402	542	25
Jersey Dantziz.	Ditto.	Ditto.	Ditto.	Ditto.	Aug. 12.	43½	4681	430	63	2161	606	25¾
Whiting-ton.	Ditto on a red clay bottom.	2 hhds. lime, 6 qrs. lime ashes, 5 qrs. kelp ashes,	3 bush.	Jan. 8.	Aug. 24.	33	7786	483	61	1454	524	23½
Belle-vue Talavera.	Ditto.	Ditto.	3 bush.	Feb. 3.	Aug. 17.	52	5480	282	61	2485	626	25

"One ear of a superior variety of wheat, sowed grain by grain, and suffered to tiller apart, produced four pounds four ounces of wheat; whereas another of an inferior sort treated in the same manner produced only one pound ten ounces."—*Le Couteur on Wheat*, p. 11.

"The pains I took in making those first selections amply rewarded my labors, as the produce of my crops was increased on an average of about twenty-three to twenty-five bushels an acre to thirty-four, and since I have raised wheat from single ears, or carefully selected sorts, I have increased my crops to between forty and fifty bushels the acre."

Ibid, p. 14.

"No. 1, produced 3 lbs. 3 oz. from 61 grains, and 3 lbs. 9 oz. weight of straw of a beautiful white color; whereas, No. 14, a red variety, only produced from 59 grains, 1 lb. 10 oz. of wheat, and 2 lbs. 5 oz. of straw.

"No. 8, a downy variety, was still more productive than No. 1, as fifty-five grains produced 4 lbs. 4 oz. of wheat, and 3 lbs. 13 oz. of straw, its average of tillers being 11; the straw of a fine color, and the sample very beautiful, though scarcely so fine, or thin-skinned as No. 1.

This produced nearly three times as much corn (grain) as No. 14, and a third more straw."—*Ibid*, p. 24.

"From careful observation, it appears that some varieties, if sown the second day, differ in their period of flowering, many days; even ten or twelve intervening."—*Ibid*, p. 64.

H.

ON USING THE BEST SEED.

"Some people have recommended the sowing of blighted and mildewed wheat, because it will vegetate, though certainly the recommendation, if carried into practice, would be attended with imminent danger to those who practise it. That light or defective wheat will vegetate or produce a plant, we are not disposed to contradict; but that it will vegetate as briskly, or put out a stem of equal strength, and capable of withstanding the severe winter blasts as those produced from sound seed, we must be excused from not believing. Let it only be considered that a plant of young wheat, unless when very early sown, lives three or four months, in a great measure, upon the nourishment which it derives from the parent seed, and that such nourishment can in no view of the subject be so great when the parent is lean and emaciated as when sound, healthy and vigorous. Let it also be remembered, that a plant produced from the best and weightiest seed, must, in every case, under a parity of other circumstances, have a stronger constitution at the outset, which necessarily qualifies it to push on with greater energy when the season of growth arrives. Indeed, the economy of nature would be overturned if any other result followed."—*Brown on Rural Affairs*, Vol. ii. p. 31.

"An experienced agriculturist asserts with confidence, that he has seen fields partly sown with sound and partly with mildewed wheat, and that the difference was discernible at one glance even in the winter months, during the first stage of their growth."

I give below, a decisive experiment in favor of using perfectly ripened and well-harvested seed wheat, in preference to that which is light or imperfect.

"The late Benjamin Bell, Esq., in October, 1783, sowed a field of twelve acres at Hunthill, in Roxburghshire, with 54 bushels of wheat,

of which 12 bushels were the best that could be procured in the London market of crop 1783, 30 bushels were from East Lothian of crop 1783, 6 bushels the best wheat in the London market of crop 1782, and 6 bushels produced near Edinburgh in that year 1782. It must be remarked, that 1782 was a season generally unfavorable to raising wheat in perfection, but that in 1783 the grain was sound and of good quality. The field on which these parcels of wheat were sown had been well fallowed, was equally manured with dung, and the whole of these seeds were sown in the beginning of October, all of them having been washed in strong brine, and afterwards dried with powdered quick-lime. The English seed of crop 1783 was sown on one side of the field; three bushels of the Mid-Lothian seed of crop 1782 were sown on the next three ridges; to this succeeded the English seed of crop 1782; then the East-Lothian wheat of crop 1783; and, lastly, the remaining three bushels of Mid-Lothian seed crop 1782.

“The field being all in good condition, the wheat appeared early above ground, and the shoots were every where strong, except on those ridges which were sown with the Mid-Lothian seed of crop 1782, on which the plants were weak and not very numerous; neither did these spread or *tiller* like the others; so that during the winter and spring months, the wheat on these ridges had a weak appearance; in harvest the straw was thin and short, and the ears were short and small, the grain likewise being not so large or heavy as on other parts of the field. On being threshed and measured, the produce of the 12 bushels of seed, crop 1782, both the London and the Mid-Lothian taken together, was only 66 bushels, or $5\frac{1}{2}$ after one. The produce of the rest of the field was fully 15 bushels for every bushel of seed. The difference in value was also considerable, as the produce of the seed from crop 1782 sold almost a shilling the bushel lower than the other.”—*Sinclair's Report of Scotland*, vol. i. pp. 479, 480.

I. •

QUANTITY OF SEED TO THE ACRE.

“We have stated it as our opinion, that farmers generally err on the side of sowing too profusely. The practice, however, has been still further extended by the recommendation of Mr. Coke, of Norfolk, on whose estates wheat is now sown at the rate of four bushels to an acre.

The quantity used, should be in a great measure governed by the state and quality of the land upon which it is sown. Soils naturally rich or such as are improved by cultivation and manure, will require much less seed than those in an unfertile state: on the contrary, the lighter and the less cultivated the soil, the greater will be the quantity of seed which it requires. The reason is obvious, plants tiller more in rich and strong than in unfertile soils, and therefore occupy respectively a greater space; they are less liable to be killed on good soils in the winter months; and every plant generally comes to maturity; the straw also becomes more luxuriant and consequently requires a greater circulation of air to preserve it in health and vigor; whereas the plants on light soils will but weakly and partially tiller; this deficiency of stock on the land must be supplied by producing a greater number of plants, and as the straw will not be so liable to rot or mildew on light soils, little danger need be apprehended on such from growing too thick a crop."—*British Husbandry*, p. 147.

These are the opinions of an experienced cultivator. Undoubtedly there may be an excess of seed, but the habits of our farmers are in almost all cases to sow too little seed. An experienced and successful farmer, in Hampden County, says he has found great advantages in sowing a liberal quantity of seed. Formerly, he sowed not more than three pecks or one bushel of rye to an acre, now he sows three bushels to an acre on the intervale land of Connecticut river, and finds an advantage in it.

Mr. Coke was led to adopt the practice of sowing very liberally from accidental circumstances, which I shall give an account of in the words of his steward.

"In this case, at Holkham, Eng., the wheat was drilled, distance not given. The first was on a field of thirty acres. One drill man deposited four bushels to the acre; the other gauged his drill wrong and deposited only three bushels to the acre. The four-bushel-seeding escaped the mildew and was a very fine crop; the three-bushel-seeding was mildewed and was the only thin wheat, and the only mildew worthy of notice on the farms.

The other experiment was in a field of thirty-five acres. Part of the field was drilled with five bushels to the acre, and part with four bushels. Many practical men gave it as their opinion, that the five bushels seeding was the best in the field."—*Blaikie on Mildew quoted in British Husbandry*, p. 146.

J.

FOOD OF PLANTS.

“The chief source from which plants derive the materials for their growth is the soil. However various the composition of the soil, it consists essentially of two parts, so far as its solid constituents are concerned. One is a certain quantity of earthy matter, such as siliceous earth, clay, lime, and sometimes magnesia; and the other is formed from the remains of animal and vegetable substances, which, when mixed with the former, constitute common mould. A mixture of this kind moistened by rain affords the proper nourishment of plants. The water, percolating through the mould, dissolves the soluble salts with which it comes in contact, together with the gaseous, extractive and other matters which are formed during the decomposition of the animal and vegetable remains. In this case it is readily absorbed by the roots and conveyed as sap to the leaves, where it undergoes a process of assimilation.”

“But though this is the natural process by which plants obtain the greater part of their nourishment, and without which they do not arrive at perfect maturity, they may live, grow, and even increase in weight, when wholly deprived of nutrition from this source. In the experiments of Saussure, sprigs of peppermint were found to vegetate in distilled water; and it is well known that many plants grow when merely suspended in the air. In the hot house of the botanical garden of Edinburgh, for example, there are two plants, species of the fig tree, the *Ficus australis* and the *Ficus elastica*, the latter of which has been suspended for ten, and the former for nearly sixteen years, during which time they have continued to send out shoots and leaves.”—*Turner's Chemistry*, p. 565.

“There are some plants that fasten themselves and grow upon the most barren rocks, deriving from the surrounding air and from rains, all the nourishment required by them; of this number are the mosses, the lichens, and the fleshy plants. Their growth is slow; their transpiration almost nothing, and their color remains nearly the same all the year round, so that they constantly absorb water, and carbonic acid; and assimilate their constituent principles.”—*Chaptal*, p. 92.

K.

CHEMICAL PHENOMENA IN GERMINATION AND VEGETATION.

“The conditions necessary to germination are three fold; namely, moisture, a certain temperature, and the presence of oxygen gas. The necessity of moisture to this process, has been proved by extensive observation. It is well known that the concurrence of other conditions cannot enable seeds to germinate, provided they are kept quite dry.”

A certain degree of warmth is not less essential than moisture. Germination cannot take place at 32° ; and a strong heat such as that of boiling water, prevents it altogether, by depriving the germ of the vital principle. The most favorable temperature ranges from 60° to 80° ; the precise degree varying with the nature of the plant; a circumstance that accounts for the difference in the season of the year at which different seeds begin to germinate.

That the presence of air is necessary to germination, was demonstrated by several philosophers, such as Ray, Boyle, Maschenbroeck, and Boerhaave, before the chemical nature of the atmosphere was discovered; and Scheele soon after the discovery of oxygen, proved that beans do not germinate without exposure to that gas. Achard afterwards demonstrated the same fact, with respect to seeds in general, and his experiments have been fully confirmed by subsequent observers. It has been even shown by Humboldt, that a dilute solution of chlorine, owing to the tendency of that gas to decompose water, and set oxygen at liberty, promotes the germination of seeds. These circumstances account for the fact, that seeds when buried deep in the earth, are unable to germinate.

It is remarkable that the influence of light, which is so favorable to all the subsequent stages of vegetation, is injurious to the process of vegetation. Ingenhouz and Sennebier, have proved that a seed germinates more rapidly in the shade, than in the day-light; and in diffused day-light, quicker than when exposed to the direct solar rays.

From the preceding remarks, it is apparent that when a seed is placed an inch or two under the surface of the ground in the spring, and is loosely covered with earth, it is in a state every way conducive to germination. The ground is warmed by absorbing the solar rays, and is moistened by occasional showers; the earth, at the same time, protects the seed from the light, but by its porosity, gives free access to the air.”
Turner's Chemistry, p. 562.

L.

ON DRAINING AND SUBSOIL PLOUGHING.

The statements, which I give below, are from an examination had before a large committee of the British Parliament, relating to draining and subsoil ploughing. I at first intended to give only a short abridgment of them; but they are of such remarkable importance, that I have chosen to give them at large. I know they will be read with the greatest interest.

As my report is going through the press, it gives me pleasure to say, that Messrs. Ellis & Bosson, in North Market Street, Boston, with a commendable and patriotic enterprise, have imported one of Smith's subsoil ploughs, of which I gave an account and an engraving in my First Report of the Agriculture of Massachusetts. Its construction is altogether peculiar; but with sufficient power, there is no doubt it will prove effectual. It is an expensive article to be imported; but it is probable, especially as they are not patented, that they will be manufactured here at a reasonable rate. If the system is faithfully carried out, there cannot be a doubt, of its extraordinary and most beneficial effects. It is only due to these gentlemen, to add, likewise, that they have imported a great variety of wheats, other grains, and grass seeds, with samples, also, in the straw, of the finest kinds, and which must prove of eminent utility to our agriculture.

Our distinguished fellow citizen, Mr. Webster, of the United States Senate, likewise, in his recent visit to Europe, took pains to bring home, at considerable personal trouble and expense, large samples of wheat, oats, barley, beans, vetches, and turnips of the best kinds, cultivated in England, which were placed at the agricultural establishment of Messrs. Breck & Co. in N. Market Street, Boston. This is conferring an eminent benefaction upon the country, and essentially adding to the great obligations which his fellow citizens are under, to his intelligence, public spirit, and patriotism.

Statement by T. F. Kennedy, Esq of Dunure, formerly M. P. for the Ayr Burghs, respecting his experience of the System of Draining and Sub-soil Ploughing, recommended by Mr. Smith, of Deanston, in the county of Stirling.

MAY, 1836.

I have practised Mr. Smith's system of draining and sub-soil ploughing upon my farm, in the county of Ayr, during the last three years,

and the result has fully justified every anticipation of benefit. It is applicable to all soils not rocky which have not an absolutely porous sub-soil, the great object being, that the sub-soil should be rendered artificially porous, and that all rain-water should sink on the spot on which it falls, and that no running of water should take place on the surface.

There was, at the outset, considerable difficulty in having the work executed; it was arduous, and those engaged in the superintendence and labor were adverse, because they did not see the principles of the system, or the advantages which were likely to arise. A little encouragement and a distinct intimation that there must be perseverance, overcame every difficulty. This observation applies to the sub-soil ploughing, while some difficulty attached to the perfect execution of the drains, in having them made of the full depth of 30 inches, and filled neither too much nor too little, and with all due care in all particulars which must be attended to to secure permanence in the effects. I have invariably made the drains twelve feet apart, in order to secure the effect being complete; being much impressed with the folly of spending a considerable sum per acre in the operation, and still failing to obtain what I may term perfection in the system. I have also used broken stones as the material when they could be obtained within such a distance as to prevent the expense of cartage being excessive; in other cases I have used tiles, with a layer of three or four inches of stones or gravel over them. When stones alone were used, the drains have been uniformly thirty inches deep, leaving 16 inches for the operation of the plough and sub-soil plough; where tiles have been used, the depth has been about 24 inches, the same depth for the ploughs being left as in the other cases. A crop of oats has generally been taken after the drains have been executed, and the land has been comparatively dry; but even the visible effect has been very imperfect until the sub-soil plough has been applied. By means of this plough the whole obdurate undercrust of the soil has been broken up, and all water has instantly escaped, and, after six or eight months of the alternations of heat and cold, wet and dry, a most remarkable change has appeared in the condition of the soil; what was before obdurate and retentive has become comparatively mellow and friable, and the longer the time since the operation has been performed, the greater has been the perceptible progressive effect. The operation of the sub-soil plough has produced cracks and crevices and interstices to the depth of 16 inches; through these the rain passes off with rapidity, and these crevices are imme-

diately filled by the air of the atmosphere, and during dry and hot weather these cracks and crevices are multiplied to an indefinite extent, and in clay soils to an extent quite remarkable. Instead of resuming its original tenacity, there seems to be a decided change effected in the character of the component parts of the land to the depth the plough has reached. It is for the skilful farmer to apply manure judiciously according to the state of each field. Drilled green crop has followed a crop of oats, and the land which before was unfit to grow turnips has become fitted for that crop, although, perhaps, a little rough and cloddy during the first year. Next has come a crop of wheat, and in it has been seen the great and remarkable effects of the system, in the condition of the soil and the quantity of produce. Land which was before, in truth, unfit to carry wheat from extreme wetness, has become altogether the reverse, being sown with wheat without ridges and furrows, being perfectly porous; all rain disappearing as it falls, and being carried off by filtration to the many drains, and each drain having little more than a thread of water to carry off. Possibly the land of which I speak might have previously yielded a precarious produce of 20, or at the utmost 24 bushels of wheat per imperial acre, while in its improved state, the actual produce of the crop of 1835 has been 40 bushels thrashed out, a few bushels of which were not very good in quality, owing to what is now to be mentioned. The fault of the crop was, that it was too strong, and there being much rain while it ripened it was laid down. Had this not occurred, the quality of the whole would have been good, and there is no doubt that six or eight bushels more per acre would have been obtained. The facts, therefore, are most satisfactory, because the result in the first wheat crop may truly be said to be twenty bushels of wheat of extra produce, in return for an expense of 10*l.* 10*s* per acre, which was the cost of the drainage and the extra expense of sub-soil ploughing. It ought to be stated, that with the turnips, the land was well manured, and subsequently abundantly. After the wheat was carried, and during the winter, the field was ploughed about nine inches deep with the ordinary plough, and remained rough until the month of March, the whole rains of winter, which were excessive, sinking as they fell. Towards the end of March, the field was harrowed, drilled, and sown with beans, without any manure. The crop is promising, and there can be no doubt that the powers of the soil which have now been brought into action, will render it abundant. The soil is so powerful, that it is intended to take a crop of wheat after the beans, without any manure,

but taking care to make the land perfectly clean ; and there is little doubt that the wheat crop of 1837 so treated, will be more productive than that of 1835, because it will be less superabundant in straw, and incur less probable injury from being laid down.

My experience, on a moderate scale, leads me to say, that the system is the greatest discovery which has been made in agriculture (because it is applicable to soils hitherto almost intractable and most expensive to cultivate,) provided it be applied only where the altitude justifies the undertaking, by securing a climate suitable to valuable crops. It, in truth, converts almost the worst into the best land, that is, the most powerful in respect of production, because the quality of land to which it is applicable, the heavy clays and retentive sub-soils, will yield heavier crops after such treatment than the lighter loams and many of those varieties of soil which hitherto have been so pleasant to the agriculturist to cultivate.

The reformation which the system effects on lands, which previously were looked on as hopeless, is quite surprising, and no one believes it until it is seen ; but again I say, that the whole success depends on the perfect and complete manner in which the operations are executed, as any thing merely being an approximation to the system will end in disappointment. The expense of what is perfect must not be grudged, and as surely as it is liberally given will it be abundantly repaid. I would also say, that the effects of the draining and sub-soil ploughing are dependent on each other ; the one is comparatively worthless without the other ; the ploughing would be thrown away without the previous draining, and the draining is a poor improvement compared to the combined effect with the sub-soil ploughing.

I may state, that my bailiff and the ploughmen who worked the sub-soil plough, certainly in the outset thought my orders almost foolish, (who nevertheless carried them into effect faithfully,) but now see the effects of the system, and are fully sensible of the extraordinary benefits resulting from it.

The various views of the advantages might be multiplied to any extent, but a concise statement of them seems to be, that the most obdurate and intractable soils assume a friable and mellow character, and at the same time are rendered permanently most productive. A system which is applicable to 10 acres is equally so, in its principle, to 10,000 or 100,000 acres, and consequently the system becomes a most important national consideration. My decided impression is, that capital judiciously applied in the execution of this system may yield a

return varying from 10 to 40 or 50 per cent., according to the various circumstances attending the infinite variety of cases in which the system may be carried into effect. Every thing depends on the mode and perfection of execution, if any one thinks of limiting the expense of complete execution, he may rest assured, that the recompense will be still more restricted, and that it is more judicious to improve one acre well, than to deceive himself by a superficial operation on a more extended surface.

A remarkable effect is, that the harvest is considerably earlier on land so treated than on the same land in its previous state, and it is scarcely necessary to remark, that there will be a constant return for the same seed and labor and manure far greater than when they are applied to land in a naturally wet condition.

Evidence of JAMES SMITH, ESQ., inventor of the Sub-soil Plough.

Chairman. You live at Deanston?—Yes.

Where is that?—In the western district of Perthshire in Scotland.

Do you occupy a considerable farm in that part of Scotland?—About 200 acres.

Have you improved your farm lately?—I have.

In what way?—Chiefly by thorough draining and sub-soil ploughing.

What was the nature of the soil upon your farm?—It was various; there is some part of it rather light soil, some of it gravelly upon the edge of the river, and some lightish loam, with rather a tenacious bottom, and in other parts a stiff sandy clay.

Is it a stiff sub-soil?—Some part of it very stiff.

And it was all subject very much to wet?—The greater part of it was covered with rushes and bent before being drained.

Will you describe to the Committee your mode of draining?—The principle upon which I drain is to put in drains frequently, so that there may be opportunities for the water to pass off, because I find that in our climate the chief injury arises from the water that falls from the heavens.

Are those drains placed up the furrows or across the land?—They are placed in the same direction that the furrows were before, but I have now no furrows. I lay all my fields down without any furrows.

I object to furrows, because water is allowed to collect in a body, and thereby ruins the soil.

The fact is, that those drains are so frequent, that they answer the purpose of furrows?—Yes; they answer the purpose of furrows.

How far are they apart?—Twenty-one feet, and two feet six inches deep to the bottom.

Do you drain with stones or with tiles?—Chiefly with broken stones, because I have stones upon the land.

You spoke of sub-soil ploughing; you are the inventor of a sub-soil plough?—I am.

Do you use it after draining?—After draining. I first take a grain crop, and then after the separation of that crop from the ground I sub-soil plough.

How far do you fill up the drain with stones?—I put in 12 inches of stones, leaving 18 inches between the upper part of the drain and the surface of the soil, and then I cover them most carefully with very thin sods, overlapping at the joinings, because it is of the first importance to prevent the soil which has been recently removed from running into the drains. There are many drains destroyed by means of the soil getting in at the top.

The water comes in at the side of the drains?—Yes, by fissures in the sub-soil.

Will you describe the operation of the sub-soil plough?—I have got a plate of it here (*producing the same.*)* The principle upon which I constructed that plough was this, that I saw it was of the greatest importance to break up the sub-soil, especially where it was tenacious. I saw that the common trench plough, when used to break up the sub-soil, at the same time turned over the recently moved sub-soil to mix with the surface soil, which induced a sort of partial sterility for a time. I then bethought me of having a plough that would move the sub-soil, still retaining the active soil upon the surface, and I considered how I should construct it to have the least draught, so that the horses might easily draw it, because I was aware that it would require considerable force. I therefore made the plough as thin as possible in its transverse section, and the share of the plough, which is usually made with a free point not touching upon the lower part of the plough, and I found it was apt in stony land to get knocked out of its place, and therefore I made a mortice in the sock, and inserted the

* See First Report of Agriculture of Massachusetts, p. 1.

point of the share in this mortice: then in order to move the sub-soil as much as possible, I placed an oblique spur upon the one side of the plough, which throws up the subsoil after the furrow has been divided and breaks it, but does not throw it further up than the bottom of the furrow of the active soil.

Mr. Hadley. Does not the spur increase the draught?—It does not materially.

How many horses does it require to work that plough?—Generally four horses in ordinary sub-soils, but upon some it has been necessary to use eight horses.

How deep do you plough?—Sixteen inches from the surface.

Mr. Loch. What is the depth of the original furrow?—Six inches; we first go on with the common plough and turn over a furrow of the depth of six or eight inches, and then the sub-soil plough goes and stirs up the bottom without bringing the soil further up than its original position, then when the common plough comes round again, it throws the active soil upon that part which has been sub-soiled.

Then the advantage of stirring up the sub-soil is that the water which falls gets down to the bottom of the second furrow so as to relieve the upper soil from the effects of the rain that falls?—Yes; *besides there is a constant operation of the air upon the sub-soil, which converts it into soil.*

Mr. Cayley. Is it with a view to draining principally?—With a view first to draining, and then to converting the sub-soil into a fit soil for growing plants.

It makes the soil more permeable?—Yes.

How long have you been doing this?—About twelve years.

In the first instance, if you were to turn up that sub-soil, it would not be a productive soil, and therefore you prepare it by this course for subsequent turning up when it is prepared?—Yes.

When you conceive it to have come into a proper state for vegetation, do you turn it up at once or gradually?—At once.

Do you find that the soil will be very productive the first year after it is turned up?—I find it so.

Do you stir it up with the old soil?—I sub-soil it only once. I then take a green crop, followed by a grain crop; then it lies three years in grass; and then after that, I take a crop of oats; and then after, I turn it up to the depth of sixteen inches.

Then it takes about three or four years to bring the sub-soil to a proper degree of preparation?—It does.

After the sub-soil has been brought into a proper degree of preparation for vegetation, have you ever tried the experiment of bringing in a certain proportion, say a fourth part of the sub-soil after it is prepared, into co-operation with the active soil?—I have, and it answers very well.

Do you consider that the bringing into play the whole of the sub-soil at once is a better thing and more productive than holding in reserve a portion of the sub-soil?—I think it is.

After turning up the sub-soil, how many years have you grown crops upon it?—My mode of cropping is a seven years' shift, and I have now four fields undergoing a second shift.

Have you had the experience of what the condition of the previous active soil becomes, from being in a state of rest for several years?—It is all mixed together.

Then the effect of your system is to produce a new soil instead of the old one?—Yes.

Mr. Denison. According to your plan, supposing you were not to have turned up any of this sub-soil, but merely to have had your sub-soil plough pass through it, and were to go on cultivating without any thing being turned up to the top, instead of producing sterility, would even that produce an improvement of the crop?—It would, and a continued improvement.

After getting upon land that has been sub-soil ploughed, and then ploughing it up again, do you find that the sub-soil continues friable?—I do to the bottom.

With strong tenacious soils you do not find that it is run together again?—No.

Mr. Heathcote. You have no furrows, and you plough 16 inches deep in all parts of the farm?—Yes.

Do you find that the water stands at the bottom of the furrow any length of time before it gets into the drain?—I do not think it does, but I cannot see the bottom of the furrow.

When you turn it up how do you find it?—I find it particularly dry, and sometimes, where the land has been poached in consequence of taking off a green crop, still it is perfectly dry at the bottom of the furrow.

You do not find that the treading of horses has any effect upon it at that depth?—None whatever; the effect of the most thorough poaching does not go beyond six inches, and below that it is found quite dry.

Will this sub-soil ploughing apply to all species of soils?—I have never yet seen any soil that it would not apply to.

The most retentive stiff soil?—Yes; and the deep bog as well.

Mr. Denison. After breaking up the sub-soil, but without turning it up to the top, suppose the farmer was to continue to plough it seven or eight inches, in that case how long do you think the operation on the sub-soil would remain effectual, or how soon do you suppose it would run together again?—*I think it would never run together in a solid form, because, when it has been turned up there is a constant circulation of the water and the air, which prevents running together again; and when soil is laid in a dry position and exposed to the atmosphere, it seems to get some sort of attractive quality; if you look at any mould you will find that it is all in little globules, and those are gathered together in large masses, forming larger globules which keep the soil open.*

Do you think that the mere operation of allowing water and air to pass among the soil at a considerable depth in the ground would, to a certain degree, produce that effect upon solid clay of converting it partially into soil?—I think it would.

Mr. Loch. What was the nature of that soil which you said was covered with bent before you ploughed it up?—A great part of it I did not think worth more than 5s. an acre.

In consequence of what you have done to it, what is it worth now?—I consider that it is worth 2l. an acre to any farmer.

What was the course of cropping that you adopted in the improvement of land?—At first I was rather undecided with regard to the rotation I should follow, till from observation I formed a judgment what was the best course. The mode of rotation I generally followed was this: I drain always, if possible, in the lay or grass, because by draining in the lay the work is more neatly done; then having completed the drains, I take a crop of oats the next year. Upon the greater part of that farm I have been obliged to plough very shallow furrows for the first crop, because there was not more than three or four inches of soil that I dared turn up; then I took a crop of oats, and upon some of the fields I had not more than from 24 to 30 bushels of oats. After the separation of that first crop from the ground, I applied the sub-soil plough. Then I gave it another ploughing, and had a green crop; potatoes upon some parts, and turnips upon others.

Could you have attempted any of those crops previous to the sub-soil ploughing?—Not to advantage.

How long had it been in grass before you turned it up?—Some of it 15 years.

What is the next crop after the turnips and potatoes?—I then lay down what I have had in potatoes with wheat; I sow wheat in the end of the season, as soon as I can get the potatoes up; what I have had in turnips I grow barley upon in the spring, and I sow grass seeds upon both.

You could not have attempted barley upon that soil before?—Not with any success, and not wheat, because the land was so full of moisture that it honey-combed by frost, and so threw out the plants. There was one field especially, after a very severe winter, and with a frost, there was sometimes a space of 20 or 30 square yards from which every plant or vegetable had been thrown, not a bit of grass remaining upon it.

After the wheat what do you take?—I sow grass and barley.

Do you cut the grass for hay?—Some; the other is pastured from the beginning.

What is the nature of the grass it produces?—Very good, and very heavy crops of hay; I have generally about 300 stone, which is about three tons per acre.

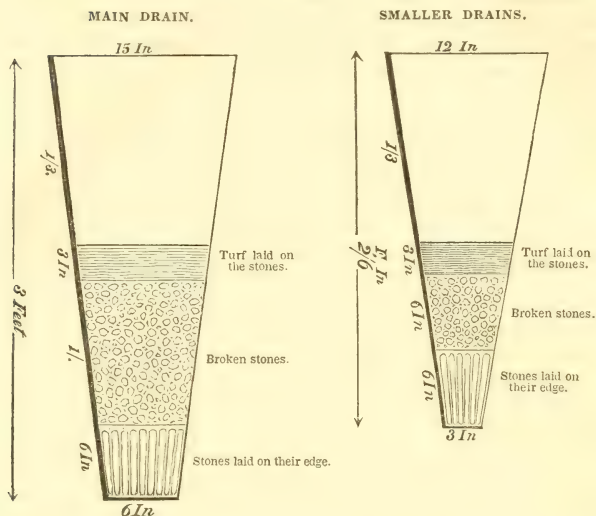
Do you think that any improvement is likely to be so valuable for general purposes as frequent draining and sub-soil ploughing for strong land?—None.

That, you think, is the most important thing for general purposes of farming that you are acquainted with?—Decidedly.

And applicable to more qualities of soil than any thing else?—Applicable, I should say, to all qualities of sub-soil.

And equally applicable to England as to Scotland?—Equally so, and very much wanted. I have a friend who has made an experiment under my directions in Cheshire, upon very stiff land, Mr. Barton; it is the most thorough brick clay I ever saw; an extremely sterile farm in its original state. Mr. Barton has been completely successful; he has thoroughly drained the ground and sub-soil ploughed, and it is now laid down without furrows, and I there saw a large field of this extremely stiff clay with a beautiful seed surface upon it.

Mr. Denison. Do you think that it is applicable to a soil where there is a bad gravelly sub-stratum?—I think so; I think any sub-stratum, if it is exposed to the atmosphere for a sufficient length of time, will become fertile. In the most barren country, if you see where a ditch has been dug, on the soil which has been thrown up you will generally find a richer verdure and strong weeds growing.

White's account of Draining, on Smith's plan.

The main or leading drains are cut 3 feet deep, 15 inches wide at the top, taper to 6 inches at the bottom, and filled up with stone from 15 to 18 inches. The smaller drains, leading into the main, are 2 feet 6 inches deep, 12 inches wide at the top, taper to 3 inches at the bottom, and filled with stone 13 inches, with turf upon the stone. The stone is first placed on edge, about 6 or 7 inches, and the remaining part covered with stone broken to $2\frac{1}{2}$ inches; a section of these drains is given—the drains are parallel to each other. The sub-soil varies much; the price for cutting the whole, breaking the stones, and filling, has invariably been 1*d.* per yard; some part has worked better than others, and, upon the whole, I think the work cannot be done for less. With regard to the distance between the drains, in this part, the work must be put out according to circumstances, which requires much attention, as great expense might unnecessarily be incurred, or the object fail. When the land is ready for the operation of the sub-soil plough, a man with a pair of horses turns out the first furrow from 10

to 12 inches wide; then follows the sub-soil plough to the depth of 14 inches, taking care not to stir the turf covering the stones in the drains; it is worked at right angles of the drains, and drawn by six horses, two and two abreast. The plough is drawn from an axletree, with double shafts and low wheels; the horses draw perfectly even, and by this mode it is no more than ordinary work.

An account of the application of the Sub-soil Plough to a dry soil at Heckfield, Hants. By Charles Shaw Lefevre, Esq. M. P.

Although the effects of the sub-soil plough in the improvement of wet and tenacious soils are well known, I am not aware that any one has as yet applied this valuable implement to soils of a totally opposite character: I will therefore state the result of an experiment which I have tried upon land in my own occupation.

I have a field of 6 acres, which for many years has been scarcely worth cultivating. It consists of a light sandy soil, from 5 to 7 inches in depth, covering a stratum of hard gravel. This stratum varies in depth from 8 to 12 inches; and below it there is a yellow sand, with a very slight admixture of loam.

There are no springs in the field; but, in wet seasons, on those spots where the surface of the field is uneven, the water is retained in pools until it has evaporated. In other parts of the field the same passes off immediately, without being retained or absorbed by the sub-soil; and, consequently, in dry seasons the crop is invariably parched and burnt up. It occurred to me to apply the sub-soil plough, which had worked such wonders in a clay soil, to a dry burning gravel.

The effect of my experiment will be best explained by a short statement of the produce of the field, for a series of years, up to the present period:—

YEAR.	CROP.	PRODUCE PER ACRE.
In 1832, - - -	Oats, - - -	4 sacks.
1833, - - -	Turnips, - - -	Not quite 2 tons.
1834, - - -	Barley, - - -	Not quite 4 sacks.
1835, - - -	Clover, - - -	2 tons on the whole field.
1836, - - -	Wheat, - - -	3 sacks.

In the autumn of 1836 it was ploughed with the sub-soil plough, at a cost of 30s. per acre.

1837, - - -	Turnips, - - -	8 tons per acre.
1838, - - -	Barley, - - -	10 sacks per acre.

In other respects the land received the same treatment during the whole of this time. There is at present a fine plant of Dutch clover in the ground, which promises to prove an excellent crop.

Extracts from the Speech of DANIEL WEBSTER, of U. S. Senate, at the agricultural meeting in Boston, 13 January, 1840.

Mr. Webster proceeded to state, that one of the things which now attracted much attention among agriculturalists in England, was the subject of tile draining. This most efficient and successful mode of draining is getting into very extensive use. Much of the soil of England, as he had already stated, rested on a clayey and retentive sub-soil. Excessive wetness is prejudicial and destructive to the crops. Marginal drains, or drains on the outside of the fields, do not produce the desired results. These tile drains have effected most important improvements. The tile itself is made of clay, baked like bricks; about one foot in length, four inches in width, three fourths of an inch in thickness, and stands from six to eight inches in height, being hemispherical, or like the half of a cylinder, with its sides elongated. It resembles the Dutch tiles sometimes seen on the roofs of the old houses in Albany and New York. A ditch is sunk twenty-four inches in depth, and these drains are multiplied, over a field, sometimes at a distance of only seven yards apart. The ditch; or drain, being dug, these tiles are laid down, with the hollow side at bottom, on the smooth clay, or any other firm sub-soil, the sides placed near to each other, some little straw thrown over the joints to prevent the admission of dirt, and the whole covered up. This is not so expensive a mode of draining as might be supposed. The ditch, or drain, need only be narrow, and tiles are of much cheaper transportation than stone would be. But the result is so important, as well to justify the expense. It is estimated that this thorough draining adds often twenty per cent. to the production of the wheat crop. A beautiful example came under his observation in Nottinghamshire, not long before he left England. A gentleman was showing him his grounds for next year's crop of wheat. On one side of the lane, where the land had been drained, the wheat was already up, and growing luxuriantly; on the other, where the land was subject to no other disadvantage, than that it had not been drained, it was still too wet to be sowed at all. It may be thought singular enough, but it was doubtless

true, that on stiff clayey lands, thorough draining is as useful in dry, hot summers, as in cold and wet summers; for such land, if a wet winter or spring be suddenly followed by hot and dry weather, is apt to become hard and baked, so that the roots of plants cannot enter it. Thorough draining, by giving an opportunity to the water on the surface to be constantly escaping, corrects this evil. Draining can never be needed to so great an extent in Massachusetts, as in England and Scotland, from the different nature of the soil; but we have yet quantities of low meadow lands, producing wild, harsh, sour grasses, or producing nothing, which, there is little doubt, might be rendered most profitable hay fields, by being well drained. When we understand better the importance of concentrating labor, instead of scattering it; when we shall come to estimate, duly, the superior profit of "a little farm well tilled," over a great farm, half cultivated and half manured, overrun with weeds, and scourged with exhausting crops, we shall then fill our barns, and double the winter feed for our cattle and sheep by the products of these waste meadows.

There was in England, another mode of improvement, most important, instances of which he had seen, and one of which he regarded as the most beautiful agricultural improvement, which had ever come within his observation. He meant irrigation, or the making of what is called water meadows. He had first seen them in Wiltshire, and was much struck with them, not having before understood, from reading or conversation, exactly what they were. But he had afterwards an opportunity of examining a most signal and successful example of this mode of improvement on the estates of the Duke of Portland, in the north of England, on the borders of Sherwood forest. Indeed, it was part of the old forest. Sherwood forest, at least in its present state, is not like the pine forests of Maine, the heavy hard wood forests of the unredeemed lands of New Hampshire and Vermont, or the still heavier timbered lands of the West. It embraces a large extent of country, with various soils, some of them thin and light, with beautiful and venerable oaks, of unknown age, much open ground between them and underneath their wide-spread branches, and this covered with heather, lichens and fern. As a scene to the eye, and to the memory by its long existence and its associations, it is beautiful and interesting. But in many parts, the soil is far enough from being rich. Upon the borders of this forest, are the water meadows of which he was speaking. A little river ran through the forest in this part, at the bottom of a valley, with sides moderately sloping, and of considerable

extent, between the river at the bottom and the common level of the surrounding country above. This little river, before reaching the place, ran through a small town, and gathered, doubtless, some refuse matter in its course. From this river the water was taken, at the upper end of the valley, conducted along the edge, or bank, in a canal or carrier, and from this carrier, at proper times, suffered to flow out, very gently, spreading over, and irrigating the whole surface, trickling and shining when he saw it, (and it was then November,) among the light green of the new-springing grass, and collected below in another canal, from which it was again let out, to flow in like manner over land lying still further down towards the bottom of the valley. Ten years ago, this land, for production, was worth little or nothing. He was told that some of it had been let for no more than a shilling an acre. It has not been manured, and yet is now most extensively productive. It is not flooded; the water does not stand upon it; it flows gently over it, and is applied several times in a year, to each part, say in March, May, July and October. In November, when he saw it, the farmers were taking off the third crop of hay cut this season, and that crop was certainly not less than two tons to the acre. This last crop was mostly used as green food for cattle. When he spoke of the quantity of tons, he meant tons of dried hay. After this crop was off, sheep were to be put on it, to have lambs at Christmas, so as to come into market in March, a time of year when they command a high price. Upon taking off the sheep in March, the land would be watered, the process of watering lasting two or three days, or perhaps eight or ten days, according to circumstances, and repeated after the taking off of each successive crop. Although this water has no doubt considerable sediment in it, yet the general fact shows how important water is to the growth of plants, and how far even it may supply the place of other sources of sustenance. Now we, in Massachusetts, have a more uneven surface, more vallies with sloping sides, by many times more streams, and such a climate that our farms suffer much oftener from drought than farms in England. May we not learn something useful, therefore, from the examples of irrigation in that country.

M.

REDEMPTION OF BOG MEADOW.

REV. H. COLMAN,

Dear Sir :—At the request of Mr. Brown, I forward you this paper. It is well worth notice. I have rarely seen labor more successfully applied. I saw the field in the month of August, and I have no question of the correctness of the statement.

JOHN W. PROCTOR,

Secretary of the Essex Agricultural Society.

I have myself been at the place two or three times, and witnessed with the highest pleasure this valuable improvement; not so extensive as many in the State, but remarkable for the good judgment, perseverance, and labor, which its execution evinces.

H. C.

“The swamp in which I have been engaged for two years past, is situated in Saugus. Between 5 and 6 acres of it I have wrought upon. The mud or soil varied from two to twelve feet in depth. Two years ago, this land was so thickly covered with briars and bushes, that it was almost impossible for a dog to pass through it. These bushes were mowed and burnt on the ground. There were so many stumps and logs that it was not possible to plough; so I commenced cutting the turf or sods into squares, about 15 inches over, and then with forked hoes, made very strong, pulled them up; and at the same time cleared out the stumps and logs, also cleared out all the small roots with the hoes, and replaced the sods the other side up. This part of the work was done in strips of about one rod in width. I commenced a year ago last August. I mowed the bushes and dug one ditch in 1836. The stumps and logs were cleared out without the help of oxen. Some of the stumps had nearly half a cord of wood in them. There were many trees blown down, and the meadow had formed over them. Many of them were sound, and some measured 60 feet in length. The stumps were very numerous. In some places, apparently three tiers, one above the other; and under the bottom one, lay a pine log, that had been on fire. The expense of clearing the land as above described, and of digging the necessary ditches to drain it, and to protect the adjoining land from fire, in burning the bushes, I estimate to have been \$504. In the winter I took off the wood and piled it up for coaling. The largest of the roots I collected for my own fire. The small ones were burnt upon the ground. This part of the labor

I estimate at \$35. In the spring, as soon as the frost began to come out of the ground, I commenced harrowing the land. The sods being fastened down by the frost, and the harrow passing over the upper side; they mouldered away as fast as the frost would admit; and when the harrow had got to the depth of the sods, they were worked up pretty fine. The frost below facilitated the passing of the teams. This part of the expense I estimated at \$12. About the first of May, I began planting the potatoes, without any manure. I cut the seed very fine, and planted them near together. I merely marked the hills with a hoe; then a man followed after with the seed; then another to cover it. I calculated to have the seed one inch from the surface. I used 89 bushels of seed. I should not have seeded so light, had it not been for the uncertainty of obtaining a crop without the use of manure. There was but one man who gave me any encouragement. Many said I should lose my labor. But to their astonishment I harvested 927 bushels of excellent potatoes. The expense of planting, cultivating and harvesting this crop, I estimate at \$117. My land is now in a condition that I can plough it when I please. On a small piece, I planted corn, without manure, and it ripened well. I sowed a small piece with wheat, but it did not come to any thing, either in the straw or grain.

The wood procured from the stumps and logs, I made into charcoal.

In 1837, I coaled 1201 bushels, which sold in market for \$166 40. Expense of coaling and marketing \$40. In 1838, I coaled 4200 bushels, which sold on the hearth for \$333 33; but I afterwards ascertained from the purchaser, that it sold in Boston market for \$630. The expense of coaling this lot, I estimate at \$100. I sold wood to the amount of \$50. I estimate the fuel that I used on my own fire to have been worth \$50 more. I have on hand 100 cart loads of the bottom of the coal pits, which I value at \$75, having some knowledge of its virtue as a manure.

The result may be stated as follows, viz.:

Proceeds of coal in 1837, ...	\$166 40
“ “ 1838, ...	333 33
Value of crop of potatoes, 927 bushels, . . .	463 50
“ the remains of the coal pits, . . .	75 00
“ wood sold, ...	50 00
“ fuel used, ...	50 00
Increased value of land, the same being now estimated at \$125 an acre, ...	565 00
Gross amount of receipts, ...	<u>\$1702 23</u>

Clearing the land, as stated, . . .	\$504 00
Carting roots, ...	35 00
Harrowing, ...	12 00
Planting, hoeing, harvesting, &c., . .	117 00
Coaling and marketing coal, . . .	140 00
	\$808 00
Estimated balance in my favor, as the result of the experiment, ...	\$894 23

My potatoes grew finely, and it was observed by many, that they never saw a handsomer field. This crop being cut off in most other places, in this vicinity, induces me to value them at 50 cents a bushel—which I know to be above the usual price in common seasons.

I have about two acres more of similar land, which I intend to manage in the same way. It requires much hard labor, but it pays well for it.

Respectfully yours,

TIMOTHY H. BROWN."

Saugus, Dec. 7, 1838.

N.

CHAPTER 206.

N ACT FOR THE ENCOURAGEMENT OF THE CULTURE OF SILK.

SECT. 1. There shall be allowed and paid out of the treasury of the Commonwealth, for every ten pounds weight of cocoons of silk, the produce of silk worms raised within this Commonwealth, the sum of one dollar, and in the same proportion for any larger quantity of cocoons, to be paid to the owner of such worms, or his legal representatives.

SECT. 2. There shall be allowed and paid out of the treasury of the Commonwealth, to every person who shall reel, or cause to be reeled, and to every person who shall throw, or cause to be thrown, in this Commonwealth, from cocoons produced from silk worms, raised in this Commonwealth, a merchantable silk capable of being manufactured into the various silk fabrics, or to the legal representatives of such person, one dollar for every pound of silk so reeled and

thrown, and fifty cents for every^a pound of silk reeled without being thrown.

SECT. 3. When satisfactory evidence, by the oath of the party, or otherwise, shall be exhibited to the selectmen of any town in this Commonwealth, that any person, being an inhabitant of such town, is entitled to claim the bounty or bounties, provided for in the first and second sections of this act, they shall give a certificate thereof, in writing under their hands, stating the quantity of cocoons produced, or of silk reeled or thrown conformably to the provisions of said sections, and that such claimant is entitled to the bounty or bounties therein allowed; and when such certificate shall have been filed in the office of the secretary of the Commonwealth, the governor, with advice of the council, is hereby authorized to draw his warrant on the treasurer therefor.

SECT. 4. If any person shall claim a bounty more than once for the same cocoons, or silk so reeled or thrown, or obtain any bounty under this act, through fraud or deception, such person shall forfeit to the use of the Commonwealth, a sum not more than one hundred dollars, in addition to the amount of any bounty he may have received, to be recovered by indictment, in any court proper to try the same.

SECT. 5. This act shall take effect in thirty days from the time of passing the same, and continue in force during the term of seven years from the time of its going into operation; and an Act entitled "An Act to encourage the reeling and throwing of silk," passed the seventh day of April, in the year one thousand eight hundred and thirty-five, be and the same hereby is repealed; but nothing herein contained shall affect the right of any person, entitled to any premium under the said act.

SECT. 6. The provisions of this act shall not apply to bodies politic and corporate. [April 11, 1836.]

O.

MULBERRY. SHARPE'S VARIETY.

As my Report is passing through the press, I have received the subjoined certificates, in reference to the tree mentioned in the text.

Windham, April 8th, 1840.

MR. COLMAN :

Dear Sir,—The trees that stand in the nursery at E. Sharpe's, are perfectly sound, while every other variety around them are killed nearly, or quite to the ground; they can be examined at any time, also those referred to in the following certificates, by the incredulous.

Very respectfully, yours,

GEORGE. W. BENSON.

Shorcham, Vermont, March 23d, 1840.

We have this day critically examined a mulberry tree called Sharpe's new variety; grown from one bud the last season in this place, which has been standing without any shelter or defence whatever. And although it was grafted late in the season, and did not soon commence growing, yet the main branch grew over seven feet, and notwithstanding its late and rapid growth, it has well endured the winter, and appears equally as well adapted to our climate as apple trees.

MIRON POND,

M. W. H. WRIGHT,

GEORGE FARNUM,

REUBEN COOK,

MUNSON POND,

ALANSON J. TREADWAY,

ASA. B. MOSES.

Pomfret, Conn. April 4th, 1840.

This certifies, that I engrafted two scions of Sharpe's variety of mulberry, in this town, last spring; both of them endured the winter well, without any defence or shelter, and are perfectly adapted to a northern climate. Their growth has far exceeded any other tree I ever saw in like circumstances.

BENJAMIN SEGUR.

P.

C. HASKELL'S LETTERS.

The subjoined are extracts from letters received by me from Calvin Haskell, of Harvard, Mass. He has had considerable experience in producing silk in a household way; and the information given by a man so practical, will be duly esteemed.

Letter I.

“*Harvard, March 9, 1840.*”

MR. COLMAN,—

Dear Sir,—I commenced about twelve years since, by sowing the seed of the white Italian mulberry. I set the trees, some in hedges and some twelve feet apart, for standard trees. I prefer the hedge to the large trees, on account of the convenience of gathering the leaves. By cutting off the tops, they are kept within reach. I have never lost any by being winter killed. About the year 1829 or '30, I purchased a few trees of the *Morus Multicaulis*, which were imported from France. I set them out and let them remain through the two first winters, without their being essentially injured, but those that were grown from cuttings were invariably killed. This induced me to take up the old trees in the fall, and re-set them in the spring. I tried various ways to protect them that I left out during winter, by enclosing some in straw, some with the boughs of pine, and by heaping the earth around the bodies and roots of the trees, but all were lost that were exposed to the winter. I, however, left out two of the old trees during the winters of 1833 and '34; they were but little injured, and in 1835 they blossomed and bore fruit, which in appearance resembled the common low blackberry, excepting their being somewhat longer. I watched them with great care, and was enabled to save only 30 of the berries. From them I obtained seed which the next year produced about 500 seedlings. From that time, with the exception of the second year of their growth, I have multiplied them by laying them in in the usual way. The seedlings differ from the parent trees, the leaf being smaller, although in rich ground they approach near the size of the real *Morus Multicaulis*. They are more rapid in their growth, having in all cases with me, out grown them when set in rows togeth-

er. The leaves, although not so large as the original tree produces, are larger than any other kind I have seen; and I think will produce as much weight per acre as the parent tree. They appear to be much more hardy, some of them have stood out without protection the three past winters without being injured. I would state, however, that the severe frost we had last fall killed the tops of many of the young trees, the bark on the bodies of the trees being started, while the tops were uninjured. The roots were not hurt, and have stood the past winter without further damage. Those trees that have not been taken up the two last years, are nearly large enough to produce seed; and I expect the next generation will be as hardy as our native trees. The two trees that produced the seed were killed in the winter of 1835, one entirely, the other all but the root. The latter started many sprouts, which I have multiplied by laying them in. I am preparing to set one acre this spring, in order to remain. If the tops should be destroyed the first year, I feel confident the roots will not be, and I have not had them hurt after the first year. I have the Canton mulberry, which was grown from seed obtained at Northampton. I have found them quite as tender as the *Multicaulis*.

I have made selections from the white mulberry, which I think are valuable, and by engrafting on the more ordinary trees, much improvement can be made. I engrafted some last spring with my seedlings, and from the selected white mulberry; both kinds grew well, and have not been injured by the past winter, excepting being somewhat broken by the snow.

I have tried the various kinds, except the Alpine and Broussa, for feeding the worms, and do not perceive any difference in the worms, as it respects their growth, or health. I have but one objection to the *Multicaulis*, and that is, they do not come forward soon enough to be depended upon in all cases. I think, in order to raise silk to the most profit, we want some kind that has a large leaf, and that is hardy, to commence with, as early as the fore part of June, and take the *Multicaulis* for the last crop. I have found that the worms that were fed early in the season, have produced the heaviest cocoons, the first weighed some over 4 lbs. per 1000, while those that wound up as late as the 10th of September were but about one half as heavy. They ought to finish their labor at least as soon as the first of September; they will then generally escape the cold storms, which are essentially injurious to the worms."

Letter II.

“ March 15, 1840.

I intended to state that the severe frost of last fall destroyed some of my young trees down to the roots, the part that appeared to be most affected was the bodies of the trees ; the bark was started and discolored. The branches of the trees, however, remained green, and did not appear affected by the frost. I considered the trees as completely killed as though the branches had been as much affected as the bodies. I left standing out in my field about 1500 of the trees, including some of those that were injured and some that were not ; they have remained out through the winter, and do not appear to have suffered by it.

By young trees I mean those of one year's growth from layers. The trees that have stood out the two past winters, were not affected at all by the frost, and are now in good order, although they have had no protection whatever.

The reason for thinking them more hardy than the *Multicaulis* is, that I have lost, I should think, nearly nine tenths of the *Multicaulis* that were left out during winter, but the seedlings have never been destroyed by it. If the tops should be destroyed, and the roots should not be, I think them valuable for the raising of silk, as the sprouts start early and grow more rapidly than from layers, and we can commence feeding much sooner.

It has been the practice of those who have raised the *Multicaulis* and other kinds of the mulberry, in this vicinity, to set them in a very rich soil, and to urge the growth as much as possible. Such a course might be profitable where the trees are to be taken up in the fall, but I think the trees much more tender than they would be when set in a poorer soil, and more liable to be winter killed.”

Q.

LETTER OF JAMES DEANE, M.D.

Greenfield, April 7, 1840.

MR. COLMAN :—

Dear Sir,—For a considerable period, my attention has been directed to the patriotic exertions made to introduce the culture of silk

into this country, but falling in with the prevailing opinions of the day, I have regarded the establishment of this important branch of agricultural pursuit as visionary and impracticable.

To satisfy myself as to the feasibility and profits of the silk culture, I have made such practical experiments in feeding worms and reeling silk, as to leave no doubts upon my mind, regarding these points. Throughout the wonderful mutations which occur in the brief existence of these precious insects, although a perfect novice, my success was complete. There is no secret, no complexity, or mystery in the art, but far otherwise. It involves but few principles, and those of great simplicity. The entire range of fundamental regulations are embraced in a sufficient allowance of space for the insects, and abundance of fodder for their consumption, a constant supply of pure air and unremitting diligence in regard to cleanliness. In our auspicious climate, an intelligent observance of these rules will surely lead to successful results.

You are probably aware, that there are two systems of rearing silk worms, the natural and artificial. The first was adopted by myself and is the one in general use, being the simplest in its details, and therefore the easiest in practice. It is adopted by those who engage in the culture of silk to a limited extent, or as a collateral branch of agriculture. It dispenses with the complicated preparations of a systematic course of rearing, and adapts itself to such ready means as the tenants of the soil possess. By the appropriation of a moderate space of ground for leaves, a crop of ten to fifty pounds of silk may be reeled, without essentially interfering with the farmers' legitimate plans. Through the operations of this system, the European markets are mostly supplied; the feeding season embracing but a brief portion of the year. Silk is, therefore, an integral production of the soil, a surplus commodity, which finds its way every where, and enriches the producer, for every body is the consumer.

The artificial system is conducted on strict scientific principles. Its prevailing features consist in maintaining an artificial temperature at the exact degree best adapted to develop the vital energies of the silk worm; in neutralizing the extremes of humidity and aridity; in incessant feeding by night and by day; and by observing such other regulations as best promote the health of the establishment, abridge its labors, and the while yielding the greatest amount of silk. Of course this plan is only chosen when the business is prosecuted on an extensive scale, for the cost of buildings and fixtures, the laborious service and

degree of skill it demands, are very considerable. The cocoonerics are fitted in a permanent style, with every appliance for pushing its little tenants through their rapid evolutions in the shortest possible period. For not only by accelerating the labors of the silk worm, do we abridge the period of its life at least one-third, but we augment its produce in a corresponding ratio. We positively obtain in twenty-four days a quantity of silk greater in amount and superior in quality than when the process is protracted through forty days; for it seems to be a law, that the nearer this precious insect is kept to a certain point of temperature, and the more assiduously its wants are supplied, the more perfect will be its developments and valuable its products. It unquestionably is so, and it would seem, therefore, that this method alone would be selected. But it must be remembered, that its application is calculated for an exclusive business, which contemplates the culture of immense numbers, and the expectation of corresponding profits. In cutting short the period of feeding we do not thereby diminish the quantity of forage; for, in large establishments, stimulated by the excitement of an elevated temperature, the consumption of leaves is enormous. In the natural system, we bestow upon a brood of silk worms no more than ordinary attention to its wants; we feed them, protect them from their enemies and the vicissitudes of climate, and leave them to that unerring instinct which impels them to construct their silken spheres. When the culture of silk is merely an incidental branch of domestic industry, it is no advantage to abbreviate its labor, at the expense of other interests, and where great numbers are not involved, it would be far from repaying the extra cost. The artificial system is a beautiful result of philosophical experiment, and, under all circumstances, the more near we approximate its regulations, without incurring its expenditures, the greater will be our success.

Whether we adopt the natural or artificial methods, it is a precaution of vital consequence, that the larvæ be distributed over an area of space corresponding to their rapid growth, taking care that they never be crowded. It matters not how well all other rules are observed, if this be disregarded, they sicken in great numbers, or, at best, spin but a worthless cocoon. To promote in them the highest state of health, free space and pure air, are indispensable. The atmosphere of the building must be kept pure by cleanliness and uninterrupted ventilation. When an abundant supply of leaves are superadded to these requisitions, we never hear in this climate of the loss of silk worms by disease. This is the secret of cultivating silk, every step of which,

from the first existence of the worm to the filature of its precious cocoons, is, with singular fitness, adapted to the comprehension and powers of the young, and to the infirmities of maturer age. The in-gathering of leaves, the management of feeding and the filature, are performances that do not exceed the strength of childhood. In the silk districts of Europe, the insects are reared, and the silk reeled almost exclusively by women and children. In an ethical sense, it is an occupation that elevates the virtues and appeals directly to the attention of philanthropists. It is a study of nature, full of instruction, that neither hardens the heart nor corrupts the conscience, by an overreaching spirit of avarice, and it should therefore be the concern of our patriotism, to cherish and encourage an enterprise, that, while it administers to our happiness, does not debase the heart. Unlike the great staples of rum, sugar, and cotton, which are extorted from unwilling labor by coercion and blood, this pursuit is destined to find welcome and peaceful reception in this region of our country, which is unsurpassed in its genial condition of soil and climate, by any other on the face of the earth. If there be those who doubt the profits of this culture, a multitude of facts might be easily adduced to overthrow their skepticism and dissipate the errors they have imbibed. But there are those who will not be convinced, though one rise from the dead.

I am persuaded, sir, that silk of the finest description can be produced in New England for two dollars and fifty cents a pound, in the first year of planting, and in the infancy of our knowledge. This estimate has been made again and again by intelligent men, and a book might be filled with reports based on actual experience, to confirm its truth. Can it be otherwise? Every variety of mulberry flourishes in our climate; and from the freedom of our atmosphere from too abundant moisture, its warmth, electricity and purity, our country is unsurpassed for the perfection of the silk worm. It is impossible that the culture of silk will not become established on a sure basis; an event, from its enormous magnitude, of momentous concern to a nation which has been drained, in a single year, of twenty-two millions, for this article of pride and comfort alone. With such propitious advantages, with such a consumption, and with the unconquerable energy of the American people, encouraged and protected by our Legislators, it is impossible that success will not crown this delightful pursuit.

If the art of rearing be then so easy of comprehension and practice, it is, nevertheless, exceeded in simplicity by the art of reeling the cocoon. I found that the difficulties of reeling had been exaggerated.

To produce a perfect filament from the material of wool or cotton, requires the perfection of skill and machinery, but we have made to our hands a filament so perfect, that no human ingenuity can ever approach it, and all we have to do consists in laying a number of these filaments together and drawing them out by the reel, and by maintaining a uniform thread, by adding new fibres, as others become exhausted. No one need be dismayed by imaginary difficulties in reeling, for they always vanish before a spirit of determination to overcome them. All who raise silk should reel silk also. It furnishes profitable employment for young women, and by reason of the delicacy of their fingers, their ingenuity and perseverance, they will readily acquire perfection in the beautiful art that should engage their especial attention.

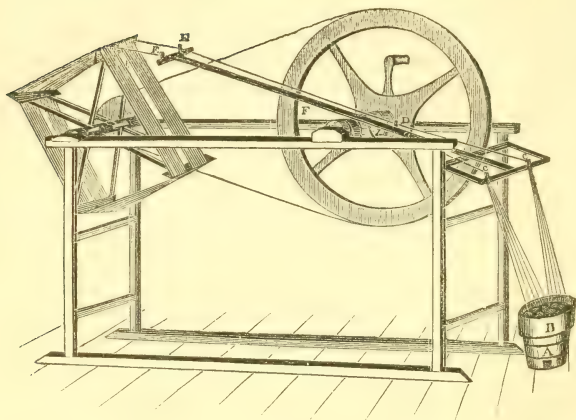
I am, dear sir,

Yours, respectfully,

JAMES DEANE.

R.

DEANE'S SILK REEL.



The furnace *A*.—The boiler *B*.—The filaments first pass the guides *C*, each thread by itself,—they then converge and pass the guide *D* together. Both divisions are then wound upon each sufficiently to insure firmness, roundness, and smoothness of thread, and they then separate, each one passing its appropriate guide *E*, and is then gathered upon the reel. It is spread upon the reel by a vibrating movement of the rod *F*, having its fulcrum at *a*, the alternating movement being given by a groove in the shaft of the pulley wheel at *b*. This groove receives a pin from the vibrating rod. The skeins are disengaged in the following manner: The two arms of one division of the reel are set inside of the other, and slip through a mortice in the shaft of the reel, and are retained by two keys driven at right angles with the arms. By starting these keys, the arms slip through the mortices, and the tension of the skein is at once relieved.—To lay out the groove, proceed in this wise: At one of the limits of the intended groove stick a pin; then just half round the shaft at the other limit stick another. A straight line from one pin to the other, and back again on the opposite side, is the track for the groove.—The guides should be made of brass or German silver, by drilling a fine hole and sawing a slit to it, all made perfectly smooth. German silver neither rusts nor corrodes.

JAMES DEANE.

S.

EXPERIMENT OF J. V. McLEAN.

The following extracts are from the account of his experiment given by Mr. McLean to the American Silk Society. Mr. McLean's experiment was made in Freehold, Monmouth county, New Jersey. Mr. McLean is a clergyman, and a gentleman of great respectability. I had the pleasure of seeing his silk. It was excellent, and universally admired.

"The weight of the silk in the case which accompanies this paper, is TWELVE POUNDS, *sixteen ounces to the pound*, and is the product of ONE QUARTER of an acre.

The soil on which my trees were grown is a heavy clay—three or four years ago, the land would not have produced 20 bushels of corn to the acre. The two previous seasons, the lot on which my experiment was made had been very moderately manured—the present season it was covered with what might be considered a good coat of marl and barn-yard manure mixed.

The 20th to the 23d of April last, I planted a half acre lot with *Morus Multicaulis* roots, cuttings, and layers. The roots were of the previous season's growth, taken from trees that did not exceed $2\frac{1}{2}$ feet. The top was cut off within two inches of the root, and the roots were laid horizontally in the row, about ten inches apart. The cuttings were from the tops of these trees, with one bud to each, and were planted six inches apart in the rows. The layers were small trees, six to eighteen inches long, and were laid continuously in the row—the root of one touching the top of another. The rows were $2\frac{1}{2}$ feet apart. The length of the lot, as planted in trees, is 288 feet, and the width 75 feet. I expected to have had roots sufficient to plant half of this lot, or a quarter of an acre—they planted, however, only 26 feet in width, and 288 in length. In making out my quarter of an acre, therefore, I was obliged to include eleven feet and eight inches in width from the layers—so that the dimensions of the lot was 288 feet in length, and 37 feet 8 inches in width.

I regretted that I had not roots for the whole quarter of an acre, as the roots afforded much more leaves than the layers. Owing to close planting and the nature of the soil, the trees produced were small—say

an average of three and a half feet. The present growth on the quarter of an acre does not exceed 5,500, all counted, large and small.

My cocoonery is 36 by 18 feet, 2 stories high. I fed almost entirely in the second story. There are two tiers of shelves three feet wide by twenty-four feet long—the shelves rise one above another—one foot apart, seven shelves in each tier. The second story contains 13 glass windows, with Venitian blinds. My eggs were of my own producing the previous season. They were saved with great care from my best cocoons, on muslin, the pieces of muslin rolled up in the fall, or soon after the eggs were laid, and placed in a common farm bag, and this was hung to a beam in the cellar. In March the muslins were folded up and laid one on top of another, in a small tea chest lined with lead, this was placed in another of the same kind, but a little larger; and the space between the two was filled with pulverized charcoal. Then a few thicknesses of old flannel was laid loosely over the top of the smaller chest, and a loose board laid over the larger. Then the whole was set in a still larger rough box, with a loose board on the top, and this was put down in the ice house, so that the ice surrounded the sides of the box. In the inner tea chest was a thermometer—the box was examined every week, and the thermometer was not allowed to rise above 45° Fahrenheit. I am thus particular as to the mode of preserving eggs, which has succeeded so well with me, because so much disappointment has been experienced in regard to eggs. Other modes equally good may doubtless be adopted for retarding the eggs—the above plan, however, succeeded with me to admiration—the last hatching, the 27th of August, was as perfect as the first.

July 18th, I hatched some two or three thousand mammoth white. July 26, five or six thousand sulphur. July 31, two or three thousand sulphur. August 19th, over 20,000 sulphur—and August 27th, hatched the last, say 5 to 8,000, sulphur. The mammoth white worms wound in 24 to 28 days—the sulphur 28 to 33 days. A few lingered to 36 or 40 days.

Green oak bushes were used for the worms to wind in. Last year I had plasterers' lathes fastened under the shelves, one and a half inches apart. I found difficulty, however, in getting the worms to ascend well. This season I used straw at first, tied up in small bundles and set on the shelves, but this did not answer as well as I had been led to expect. At length I threw every thing aside and took the oak bushes. These have succeeded with me better than any other contrivance. They seem *natural* to the worms, and I have never seen them mount

any thing so readily as green bushes. The only objection I see to them is, the cocoons cannot be taken from the bushes with quite the same facility with which they may be removed from straw, or some other fixtures. A little more experience, gathered from different sections of the country, will enable us to adopt the most approved plan for winding. Of the mammoth white cocoons, it required an *average* of 317 to the lb., weighed just as taken from the *shelves*; of the sulphur it required 390. 288 of the largest white made one lb., and of the largest sulphur 247. The worms were fed on the shelves without hurdles, and the litter was removed from the shelves about every fourth day. Sometimes they went from one moulting to another without having the shelves cleaned. The shelves were cleaned without hurdles, in the following manner. The attendant had a thin half inch board, planed smooth, 18 by 24 inches. After the worms appeared to be through their moulting, fresh leaves were given them, the attendant took up these leaves, the worms adhering, and laid them on the board which she held in her hand, and thus removed them to clean shelves; if all did not attach to the first leaves, others were strewed on, and generally the second time going over all were removed. Many objections may be urged against hurdles. They are expensive. Hurdles to feed 1,000,000 of worms will cost several hundred dollars. This expense is by no means counterbalanced by the labor which they will save, for it admits of doubt whether, after all, there is much labor saved. The worms *will not all* ascend on the fresh hurdles, and if the policy of throwing away all that *do not ascend* readily, is adopted, probably one half the worms will be thrown away; if this is not done, leaves must be thrown on after the hurdles are removed, and the worms must be taken off as they are without the hurdles. Another objection is, the difficulty of preventing the worms from winding under the hurdles and around them, among the litter. Besides the plan of feeding without hurdles is much more simple, and on this account to be recommended to the great mass of persons who will feed. My worms were fed as often during the day as they needed it, say five or six times; they were *never* fed at night. During the whole time of feeding, the weather was very variable, the thermometer ranged from 60° to 90°, with frequent easterly storms of several days continuance; one storm lasted eight days, from August 16th to August 23d inclusive. Several storms were accompanied with severe thunder and lightning. August 13th, a barn was strack with lightning and burnt to the ground, less than one hundred yards from the cocoonery. The worms appear-

ed to experience no injury whatever from the thunder. The damp wet weather undoubtedly retarded them in their operations. At such times they were not so vigorous and active, but every crop was perfectly healthy; few, if any, were lost the whole season by disease. At one time my shelves were more crowded than they should have been, and worms would frequently fall to the floor. These seldom wound after they were returned to the shelves; in this way I may have lost nearly or quite the amount of one lb. of reeled silk.

In order to be prepared for cold wet weather, I fitted up a furnace in my cellar, with flues leading up and around my upper room. I did not use artificial heat, however, more than a few times when the mornings were a little cool.

The whole number of worms fed on my quarter of an acre was about 40,000. The weight of leaves which they consumed was 2,576 lbs. The amount of cocoons produced was 130 lbs., weighed just as taken from the shelves, without sorting or flossing. After they were sorted and flossed, there was 1 lb. of floss and 4 lbs. defective cocoons, leaving 126 lbs. of cocoons. These produced 12 lbs. of merchantable reeled silk, 16 ounces to the lb., and 1 lb. wastage, ends, &c. The silk was reeled on the Piedmontese reel; the water heated in kettles, set in a furnace; one kettle was used as a heater, and the other to reel from.

From the above statement it will be seen, that it required between 19 and 20 lbs. of leaves to make 1 lb. of cocoons. Of these cocoons, without flossing or sorting, it required 10 lbs. and 10 ozs. to make 1 lb. of reeled silk. After they were flossed and sorted, it required 10 lbs. and 5 ozs., or about 214 to 215 lbs. of leaves to make 1 lb. of reeled silk. This shows a greater amount of leaves necessary to make 1 lb. of cocoons, and a greater weight of cocoons necessary to make 1 lb. of reeled silk, than the estimates published in various quarters, and greater than experiments said to have been made actually required. I was often obliged to feed *wet* leaves owing to the frequent long storms, and the worms appeared to experience no injury whatever from this. Still I did not consider it safe to feed leaves gathered in the storm, and dripping wet; and in our attempts to dry the leaves, some became wilted and were thrown away. The worms also were always abundantly fed, and a partial waste of leaves frequently, no doubt, occurred in this way. These things, together with the loss of perhaps the value of near 1 lb. of reeled silk, by worms falling from the shelves, would vary the result a little, and *might* show that 190 lbs. of leaves would produce 1 lb. of reeled silk.

I do not doubt, but that under the most favorable circumstances, a few pounds of cocoons might be produced on 10 or 12 lbs. of leaves to the lb. of cocoons. Nor do I doubt that 1 lb. of reeled silk may be produced from 8 lbs. of cocoons, or even less. Much depends on the quality of the cocoons, and more on the time when they are weighed, whether in a fresh and green, or entirely dry state. I could have selected from my lot, even in a fresh state, 8 lbs. of cocoons, which would, beyond all question, have produced 1 lb. of reeled silk—but this would be no test of the profit of the business.

Last year I produced at the rate of 510 lbs. of cocoons to the acre—*this* year I produced at the rate of 520—and my deliberate opinion is, that more will fall below this standard than will exceed it—and in *one* case, where a less quantity of leaves will give the above quantity of silk, *two* cases will occur that will require a greater.

Greatly will it be for the interests of the community, if it shall be found on farther experience, that 80 or 100 lbs. of leaves will make 1 lb. of reeled silk, instead of 214 or 215, as required in my experiment; for my quarter of an acre did produce 2,576 lbs. of leaves, and the trees were not stripped remarkably close either—then the amount of reeled silk per acre would be the handsome yield of 104 to 128 lbs!! A result I utterly despair of seeing realized.

The above shews us 48 lbs. of reeled silk, 16 oz. to the lb. as the product of an acre. If this is worth, as I understand it now is, \$6 per lb., then the gross proceeds of an acre will be \$288. The first year, let it be remembered. Or if it should be worth but \$4.50 per lb., which is undoubtedly the safest price at which to rate it, the gross proceeds of an acre will then be \$216.

In regard to the cost of production, it is confidently *asserted* by many, that it can be produced for \$2 per lb. Mine cost me much more than this. My experience, however, satisfies me that it can be produced for \$2.25 per lb., and I incline to the belief that it *may* be produced for \$2. Produced on a farm in a small way, the cost will be next to nothing—the whole product will be clear gain. Now take the product of an acre as above stated, at \$288, and allow this to be made at an expense of \$2 per lb., you have a net profit of \$192 per acre!! Allow the cost of production to be \$2.25, and you still have a net profit of \$180. Again—take the product at \$216, (allowing the silk to be worth only \$4.50 per lb.) and let the cost of production be \$2, it gives a net profit of \$120 per acre—but allow the cost of production to be \$2.25 per lb.—the sum at which I know it can be made

—and it still affords us a net profit of \$108. This last, I am persuaded, will be found more nearly to correspond with actual results. If the price of the silk is *more* than \$4.50 per lb., and the cost of production less than \$2.25, so much the better for the culturist. But the above results, very nearly, are produced in another way. The amount of help necessary to attend to one acre, or to 160,000 worms, would not exceed the value of two females, 12 weeks each, and one male, the same time—indeed, I do not believe it would require so much help—but admitting it should, the maximum *average* value of this help would be, *here*, \$3 per week, including boarding—and then, the cost of producing 48 lbs. of silk would be \$108. And the value of that silk being, as above stated, \$288, the net profit would be \$180!! Or the value being only \$4.50 per lb., or the gross amount of \$216, still the net profit would be \$108 per acre—exactly the result before stated—and this, let it be observed, is just \$4 more than the result shewn by my experiment of last year. I believe, therefore, I have demonstrated, not by *figures* and on *paper* only, but by the *actual production* of the silk, that every prudent culturist may *safely* rely on realizing a net profit of *at least* \$108, the first year, or \$180 while the price of raw silk continues what it now is. And I ask, is not this sufficient! ought not any reasonable man to be satisfied with this? I wish, indeed, I could have made the profits a *little* larger, but *I could not do it*.

Much is said in various quarters respecting the different varieties of mulberry trees as food for the silk worm. By some it is confidently asserted that the *Multicaulis* is inferior to the broad-leaved Canton, to the Broussa, and to the hundred and one other varieties for which names are invented. Others go still further, and assert that the *Multicaulis* is inferior to all other species, the paper mulberry alone excepted, which the worm will not eat at all; and that good silk *cannot* be made from the *Multicaulis*, that it is the least hardy of all species of the mulberry, (which, however, has never been proved,) and that the quality of the silk will always be in proportion to the hardness of the tree from which it is made.

Other species of the mulberry may be good, as I have no doubt they are; they may even be better than the *Multicaulis* for any thing I know to the contrary. *One thing I do know*, the worms devour the *Multicaulis* leaves with great avidity—grow well—continue healthy—make good silk, in sufficient quantities to yield a net profit per acre of \$108 to \$180. This they have done for me two years in succession.

As to the quality of the silk, I do not profess to be a judge. It obtained the *gold medal*, at the fair of the American Institute in October last, and intelligent judges pronounced it superior.

Now I say other varieties of the mulberry may *make more* and *better* silk than the *Multicaulis*. But *has* any individual actually produced more and better silk from any other tree, from a quarter of an acre? Until this is done, the public will be slow to believe that so many intelligent men are deceived, and that the *Multicaulis* is good for nothing.

It is my deliberate conviction, that the *Morus Multicaulis* will be the prevailing tree for silk in this country, as well because it is peculiarly adapted to the silk worm, as because great expense will be saved in gathering the leaves. The same amount of foliage can be gathered from the *Multicaulis*, with probably *half* the expense, that it can be gathered from any other variety of the mulberry.

I entertain now an unwavering conviction that the silk business will *triumphantly* succeed in our country. That it promises to do more for the comfort of the indigent and dependent portion of our community, especially for indigent females, and to add more to the wealth of the nation than can now be told."

[T.—For Table, see end of the Report.]

U.

MESSRS. CHENEY'S EXPERIMENT.

The Messrs. Cheney have favored the public with an account of their experience in feeding silk worms, after the plan of M. Camille Beauvais. I subjoin it as a highly interesting and valuable document, and showing remarkable results. The cocoonery of Messrs. Cheney, at Burlington, New Jersey, which I had the pleasure of visiting, is on the most approved plan.

I subjoin a comparison of the two results from G. B. Smith, of Baltimore, to whose intelligence, activity and ability, in relation to this important branch of industry, the agricultural public are largely indebted.

"We followed, as near as circumstances would permit, the plan recommended by M. C. Beauvais, an account of which we have published, and succeeded in terminating the crop in twenty-four days; and

we venture to say, that firmer and larger cocoons have not been produced by any silk grower this season. The silk reels admirably, and is strong, lustrous, and of a superior quality.

June 27th, the eggs were taken from the refrigerator, where they had been kept since the first of March, at an average temperature of 40° Fahrenheit. They were placed upon a shelf in the cellar, where the temperature was 60°. On the 29th, at 4 P. M., they were taken to the cocoonery, the temperature at that time being 78°. All worms found upon the cloths, upon their removal from the cellar, (being but a small number) were destroyed before the cloths were placed in the cocoonery. 80,000 worms hatched on the 30th of June, which we reserved for the experiment.

Date.	Internal Temperature.				External Temperature.				No. of Feedings.	Wt of leaves lbs.	REMARKS.
	6 A.M.	12M	6 P.M.	12M	6	12	6	12			
June 30	78	78	77	78	70	78	70	68	18	2	
July 1	78	78	78	78	62	78	77	68	18	4	Morning cool—used heat.
2	76	78	78	78	70	77	71	69	18	8	The weather clear in the morning, and the worms lively; in the evening rain; wind S. E.
3	76	77	79	76	66	76	79	67		2	Worms commenced moulting.
4	75	76	75	75	65	76	75	60	12	16	Worms finished moulting.
5	72	72	76	73	56	70	72	60	12	22	Clear—wind N. W.
6	72	75	76	73	55	72	73	65	12	30	Wind E.—brisk fires during the day.
7	73	76	78	77	60	80	70	68		2	Commenced moulting.
8	72	77	78	75	65	78	76	70	12	14	Finished moulting.
9	74	76	77	76	66	78	76	70	12	30	
10	71	79	82	79	65	80	82	72	12	60	Clear—wind S. W.
11	76	82	80	75	71	87	74	68		6	Commenced moulting.
12	72	75	74	73	65	74	72	62	9	80	Finished moulting.
13	72	75	75	75	64	78	70	67	9	130	
14	72	75	75	74	68	76	74	67	9	200	
15	72	76	75	73	67	78	72	65	9	134	
16	70	75	76	72	64	79	78	64		10	Commenced moulting in the evening.
17	74	76	75	76	69	80	73	67			Quite dormant—not fed.
18	70	78	80	77	63	84	85	72	8	140	Finished moulting early in the morning.
19	72	82	84	79	68	88	90	76	8	260	
20	76	82	82	78	76	86	82	74	8	400	
21	75	79	78	78	73	80	76	73	8	680	
22	74	82	82	79	74	88	82	79	8	920	
23	75	79	82	77	75	82	86	75	8	600	Shewed signs of winding—food diminished.
24	72	79	77	73	70	86	75	73	8	200	Commenced winding.

The worms were what is generally termed the 'six weeks sulphur,' and it will be seen by the above statement that they terminated their labors in twenty-four days. The amount of cocoons was 356 pounds,

and it required 225 to weigh a pound. The amount of leaves fed out was 3,970 pounds, which gives 11 pounds of leaves to a pound of cocoons, and 9 pounds of cocoons being required to produce a pound of silk, it will be seen that by this system of feeding, 99 pounds of leaves only are necessary for one pound of silk."

"In the natural system, 40,000 worms consumed 2,576 pounds of leaves; in the artificial system, 1,985 lbs. These worms produced 130 pounds of cocoons in the natural system, and 178 lbs. in the artificial. The cocoons weighed at the rate of 300 to the pound in the natural system, and 225 to the pound in the artificial. It required 10 lb. 5 oz. of cocoons produced by the natural system to make a pound of silk; and 9 pounds of those by the artificial. The 40,000 worms fed on the natural system made 12 pounds of raw silk; the same number fed on the artificial system, made 19 $\frac{1}{4}$ lbs. The natural system required an average of fully one week more time to produce the cocoons than the artificial system occupied."

V.

MANAGEMENT OF JOSEPH FIELD.

I have the pleasure of subjoining the account given by Mr. Field, of Charlemont, Franklin county, Mass., of his silk culture. His is one of the clerical examples to which I refer in the passage to which this note belongs; and his intelligence and excellence of character entitle his statements to entire respect.

Letter I.

MR. COLMAN :

Sir,—I will, by your suggestion, submit a few hints, as the result of six or seven years experience in the production of silk, in the town of Charlemont, Franklin county, Mass. One who has tested the art of managing the silk worm, only by experimenting upon a thousand or two at a time, has no high claim to be looked to for instruction, where large establishments are in operation. In small parcels none of the principal difficulties present themselves, which are to be encountered by the cultivator who, in one season, rears his hundreds of thousands in a single laboratory. My experience has been within the range of

from 10,000 to 50,000 per annum. To carry on the business to a much larger extent, with equal success, proportional caution and care will be required. In this communication I will consider the evils and hazards to be guarded against ; and the process by which the desired end may be insured.

Well made, perfect cocoons are as essential to profit in this branch of industry, as full plump grain in wheat and other bread stuffs, instead of that which is blighted and shrivelled. To accomplish this, nothing is wanted but a vigorous and healthy worm. The art to be mastered and studied, is such a treatment of the worm, commencing at its earliest existence and continuing to the end, as is found to be the surest preservative from feebleness and disease. The difference of skill or assiduity, (making allowance for the difference of temperature in the seasons,) with which this husbandry is managed, will be apparent from the proportion of worms that fail, either wholly or in part, of yielding a perfect and sound product. It can never be safely calculated that a whole brood will go through without loss, under the best regimen that prudence can adopt. But when (there being nothing peculiarly adverse in the season) the labor bestowed ends, as sometimes, in the entire loss of one quarter or more, dying when they ought to be spinning their cocoons, or the scarcely less revolting spectacle of cocoons scarcely begun and there left for want of power to do more, others half finished, and the rest, though somewhat nearer to perfection, barely worth reeling; it may be presumed that the undertaker of the enterprise began without being sufficiently aware of the nature of his task. The rearing of silk worms differs from many other employments, which, in the last result, do not materially suffer by occasional errors or neglects, they being susceptible of remedy in some after stages of the process. The worms that suffer by bad treatment or unfortunate circumstances, at any period of their existence before their work is done, are liable, more or less, to disappoint the hopes of a satisfactory return ; and among other considerations not to be overlooked, there is that which relates to atmospheric temperature. Although considerable changes may be endured without proving fatal, yet the loss of time, which is unavoidable so long as the mercury stands much below 70°, is not the worst effect produced by such an occurrence.

By some, the necessity, or even usefulness of an apartment impervious to cold air, as a place for feeding the worms, is disregarded. Experience, however, during the late cold summers, has made it certain to my mind, that he is not prepared to prosecute this business under

the most promising auspices, who has not a dwelling place for these tender objects of his charge, in which he can raise the temperature of the air to the necessary point, when it has fallen below; and thus keep the wheels in motion, or restore at once to vivacity, the torpid animals whose faculties are benumbed and labors suspended by cold. Stove heat is perfectly adequate to this want.

Being prepared with a proper receptacle for the young caterpillar, when it shall break its shell, and vegetation having advanced far enough to furnish the needed nutriment, the little embryos are to be called forth, by exposure to the influence of a summer atmosphere. The process of hatching in the warmth of early June, out of the sun's direct rays, is ordinarily effected within from five to ten days. Then commences the business which may not be intrusted with impunity to truant or slack hands; but for the encouragement of promptness, industry and attention, will find its reward at the end of twenty, thirty or forty days. Tender leaves should be laid for the worms as soon as they appear, and that will be in the morning, for two or three successive days. The product of each day should be kept by itself, if convenient, that there be no unnecessary assemblage of those of different ages. The expenditure of feed is very small during the first days of the worm; but care must be taken to serve them with fresh leaves as often as they need, and to see that none of them lose their chance of thriving by being buried in rubbish, or retarded in growth by being crowded out of their right through the greater strength and activity of their fellows. Chopping the leaves puts them in a good condition for the worm, until its powers and voracity give it an easy mastery of any thing that contains the material of silk fibre.

Through the successive ages of the worm, an eye is constantly to be had to the convenient arrangement of hurdles or shelves on which the worms are placed; the seasonable and judicious distribution of feed; their preservation from unwholesome effluvia, and from suffocation in their own litter; and other useful matters essential to their cleanliness; and such purity of air as health requires, whether in men, beasts or reptiles. As to the kind of platform upon which a discreet cultivator should deposite his little passive animals, to receive their daily sustenance, and go through their successive ages, to the production and maturity of the golden apple, every man's ingenuity will decide. Fresh, pure air, circulating freely about the bed on which the worm reposes, and which he never leaves at his own choice, is always important; and provision should be made accordingly, for ventilation, especially where the atmosphere becomes hot and sultry.

In their food, consisting of clean mulberry leaves, not too much withered and shrivelled by drying, two cautions are to be observed, relating to time and quantity. Some contend that they should be served by weight, according to a prescribed rule, varying the quantity from time to time. My practice has been to do by them as I myself like to be done *by*; that is, to measure out a portion suited to the demands of appetite, studiously avoiding irregularity and unseasonableness in the ministration. They should be fed early and late, not unnecessarily subjecting them to long intervals of fasting. Five meals a day, at least when they are in a mood promptly to dispatch what is set before them, or laid upon them, are not too much. They are not to be urged to gluttony beyond their inclination, and thus obliging them to leave a residuum to be wallowed upon rather than devoured. There are whole days when they do not eat at all, at the periods of moulting, or casting the skin, when they should not be disturbed until they have disencumbered themselves; and their appetite returns. Much depends, unquestionably, on preserving the silk worm, in all its stages, from the deadly influence of sickly, unwholesome air, arising, it may be, from a variety of causes, one of which is likely to be the accumulation of litter on the shelves, if care be not taken to remove it before moisture and decomposition render it pestiferous. Another evil, from permitting litter to grow into a pile, is often the loss of worms buried in their own rubbish, which, if extricated, can never be restored to vigor sufficient to finish their task and produce a crop. Sickness and death may come in consequence of a culpable inattention to cleanliness. The sick should be removed to some sequestered spot, where they may be restored by sweet air and tender nursing, and the dead thrown away. In removing worms to give them a clean bed, unnecessary handling of them should be avoided. While their size will admit of it, they may be removed by branches laid down, on which they readily fasten.

After nearly attaining their size, it will be found necessary to use the fingers, which should be done with gentleness. Rough handling does not comport with their soft texture. Peculiar care to keep them from falling to the floor from the hurdle is important. When they manifest a disposition to spin their cocoons, which some ordinarily do in about thirty days, no time should be lost in freeing them from all the filth and rubbish remaining under them. This being done, preparation must be made for their accommodation, with a convenient and eligible cabin, in which they may accomplish their last labor and house themselves in their silken tissue, until a mysterious metamorphosis shall

enable them to emerge into the light of day, prepared for procreation ; and to leave behind them at their death not many days afterwards, the foundation of a progeny, to be the subject and hope of another year's culture.

Various articles are used for a refuge to the worm where it may build its cell. Oak branches answer well ; but rye straw, set up at convenient distances among them, in small handfulls tied, is as good and on some accounts better than any other arrangements. Cocoons being perfectly formed and ripe, which is effected in three or four days, are to be gathered and stripped of their floss or loose silk, preparatory to reeling. If there be occasion to delay this operation more than eight or ten days, the chrysalis within the cocoon must be stifled with heat, by being baked in a moderately heated oven, or by the action of steam ; and the cocoons spread out in a safe place to dry until wanted for reeling or sale.

The cultivator may now wish to order things the most wisely for the ensuing season. To keep on the ground of experience, I state my own mode of doing the business. The best cocoons for seed, all scientific and practical men will say, is a rational maxim. Shall we therefore take the best part of our crop, cocoons yielding the most to the reeler and set them apart for seed ? Instead of this, we reserve for reeling, such as are best for that operation, which will yield their silk the most readily ; but those which we call dupions or double cocoons, and which are incapable for the most part of being reeled, we devote to propagation, and find no perceivable inferiority in the product. The silk, after the escape of the butterfly, is used to good profit by being cleansed of its gum by boiling in soap and water, and then spun like flax on the little spinning wheel, yielding an article for hosiery of excellent quality. The eggs deposited on cloth or paper, are preserved during winter from too much frost and the depredations of mice, and will be ready in spring, to be put to their proper use.

Whether the above sketch can be applied to any useful purpose in aiding the silk culture, I leave entirely to you, confiding in your judgment as to the best means of diffusing knowledge among those who look to you for instruction in what pertains to agricultural pursuits

With high esteem, your servant,

Boston, Jan. 24, 1839.

JOSEPH FIELD.

*Letter II.**Charlemont, April, 1840.*

REV. MR. COLMAN,

My Dear Sir :—My last letter enclosed samples of four varieties of mulberry leaves, White, Multicaulis, Canton and Broussa—all produced last season on the same patch of ground; by inspecting which I think one would come to the conclusion, that the more modern fashionable leaves, after all, have little or no pre-eminence to the white, being little larger in size, and, as to compactness and firmness of texture, manifestly inferior. I have formed no judgment, from my own experience, whether there would be economy in substituting other kinds for the Italian white mulberry; for I have not had sufficient opportunity for a test. There is one consideration not to be overlooked. According to the proposed modern plan of silk production, viz., by taking up the trees in the autumn and housing them, and resetting them in the spring, their foliage will be later, and require that the latter rather than the former part of summer be the season for rearing the worm. Now experience has established us in the opinion that the earlier months are incomparably preferable to the later for rearing healthy worms, and, consequently, for producing good cocoons. Trees, which will not endure the winter, must be waited on for their harvest, until those of a more hardy race have matured their crop and given it into the hand of the gatherer. If the importance of early feeding be not a prejudice, every one must see, that trees which stand the winter, must, other things being equal, be entitled to the preference. When *acclimation* shall remove the objection which lies against the larger leaved species, they may command respect, and even pre-eminence; but, to continue their triumph by *acclamation*, is not to be expected. If the leaves I forwarded to you are minutely examined, it will be judged, I believe, that the cultivators of the mulberry tree have good encouragement, even if their preferences cling to the Multicaulis, still to regard the white with favor, so much as to allow it generous fare; not to be turned off with a seat at the second or third table; or, still worse, to be denied every indulgence and kindness. A rich soil is alone able to clothe the mulberry with a rich foliage, and, for a liberal allowance of sustenance, even the common sort, so degraded and scorned, of late, will yield a noble and satisfactory return.

Most sincerely yours,

JOSEPH FIELD.

W.

THE SILK CULTURE IN FRANCE.

Deeming them both interesting and useful, I subjoin some minutes respecting the silk business in France from a high authority—Ure's Dictionary of Manufactures. The product mentioned of Mr. Folzer indicates a high degree of improvement in the management of the worm.

“ Eighty pounds French, (88 lbs. Eng.) of cocoons are the average produce from one ounce of Eggs; or 100 from one ounce and a quarter; but Mr. Folzer of Alsace, obtained no less than 165 pounds.”

“ The silk husbandry, as it may be called, is completed in France within six weeks from the end of April, and thus affords the most rapid of agricultural returns, requiring merely the advance of a little capital for the purchase of the leaf. In buying up cocoons, and in the filature, indeed, capital may often be laid out to great advantage. The most hazardous period in the process of breeding the worms is at the third and fourth moulting; for upon the sixth day of the third age and the seventh day of the fourth, they in general eat nothing at all. On the first day of the fourth age, the worms proceeding from one ounce of eggs will, according to Bonafous, consume upon an average twenty-three pounds and a quarter of mulberry leaves; on the first of the fifth age they will consume forty-two pounds; and on the sixth day of the same age they acquire their maximum voracity, devouring no less than 223 pounds. The space which they occupy on the wicker tables being at their birth only nine feet square, becomes eventually 239 feet. In general the more food they consume, the more silk will they produce.”

“ A mulberry tree is valued, in Provence, at from 6*d.* to 10*d.*; it is planted out of the nursery at four years of age; it is begun to be stripped in the fifth year, and affords an increasing crop of leaves till the twentieth. It yields from 1 cwt. to 30 cwt. of leaves, according to its magnitude and mode of cultivation. One ounce of silk worm eggs is worth in France about 2½ francs, (about 50 cents;) it requires for its due development into cocoons about 15 cwt. of mulberry leaves, which cost upon an average, 3 francs, (about 60 cents) per cwt. in a favorable season. One ounce of eggs is calculated to produce, as I have said, from 80 to 100 pounds of cocoons, of the value of one franc

52 centimes per pound, or 125 francs (25 dollars,) in the whole. About 8 pounds of reeled silk, worth 18 francs, (about \$3 60,) is obtained from these 100 pounds of cocoons. "There are three denominations of raw silk, viz. ; organzine, *trame* (shute or tram,) and floss. Organzine serves for the warp of the best silk stuffs, and is considerably twisted ; tram is made usually from inferior silk and is very slightly twisted, in order that it may spread more and cover better in the weft ; floss or *bourse* consists of the shorter broken silk which is carded and spun like cotton. Organzine and trame may contain from 3 to 30 twin filaments of the worm ; the former possesses a double twist, the compound filaments being first twisted in one direction, and the compound thread in the opposite ; the latter receives merely a slender single twist. The quality of raw silk depends very much upon the skill and care bestowed upon its filature. The softest and purest water should be used in the cocoon kettle."

NOTE.—On page 152, some little doubt is suggested whether the acknowledged superiority of silk produced in northern China and Italy, over that produced in southern Asia, be owing to climate or to the better manner of reeling. Since writing this, I have received such information from a gentleman familiar with silks of every description, and long a resident in China, that I have no longer a doubt in the case. The perfection of silk depends essentially upon the reeling ; but silk raised in cold latitudes has always more substance and firmness than that which is produced in a hot climate.

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ERRORS AND CORRECTIONS.

Page 163—line 32 from top, for "occasioned the bankruptcies and the distresses, and many of the flagrant crimes," read "occasioned many of the bankruptcies, distresses and flagrant crimes."

Page 163—line 11th—for "XXXII," read "XXVI."

Page 171—line 8th—for "XXXIII," read "XXVII."

Page 172—line 4th from bottom, for "of life," read "of a new life."

Page 233—line 3, for J. V. McLean, read D. V. McLean.

10

SUMMARY.—Success is probably a function of the following factors:

